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COMPUTER-ASSISTED COUNSELING



by

EUGENE WILLIAM ROMANIUK

A THESIS

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IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled, "Computer-Assisted Counseling", submitted by Eugene William Romaniuk in partial fulfillment of the requirements for the degree of Master of Education

ABSTRACT

This study investigated the possibility of simulating on a computer, a school counselor's behavior in interviews with ninth-grade students planning their grade ten high school programs.

In order to design the computer program used in this study, tape recordings were made of a high school counselor's verbalizations with five hypothetical grade nine students planning their tenth-grade programs. The behavior and decision rules of the counselor were analyzed and then programmed on an IBM 360/67 computer.

To assess the validity of the computer program, a sample of 30 ninth-grade students, 11 females and 19 males, was randomly selected from a junior high school. The sample was randomly divided into two groups of 15. One group was interviewed by the counselor after whom the computer program was simulated; the other group took the computer interviews. Three judges then rated the grade ten programs produced by the two modes of counseling. In addition, following the interviews, students answered an attitude questionnaire.

Two hypotheses were tested. The first hypothesis, that there was no significant difference between grade ten programs planned by either mode of counseling, was supported. The second hypothesis, that attitudes of students toward each type of interview were not significantly different, was rejected at the .05-level of significance.

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CHAPTER I

INTRODUCTION

Since the development of electronic computers approximately fifteen years ago, almost every field of human endeavor has felt the effects of the "computer age". Until recently, the field of education has used computers for routine clerical activities and has been somewhat tardy in realizing the full potentialities of the computer. This has been because education has relied upon industry to carry much of the load in computer research. Some stirrings are now evident as the field of education is beginning to shoulder more of the load in researching latent possibilities of computer use. Increased participation by education in computer research is advocated by Coulson (1966, p. 344), who states: "Education must be prepared to make a significant investment in time and personnel to support the research needed to solve these problems, because it cannot afford to forfeit the potential rewards offered by such research."

One of the areas of concern has been the applicability of the computer to the field of counseling. This study, computer-assisted counseling, explores only a small portion of school counseling -- that of educational course planning.

Currently, counselors are being increasingly caught up in the routine information processing part of their job. Berlyn (1960, p. 84) puts the case well when he states: "Why pay a counselor a counselor's salary when a clerk could be hired to do much of the work?"

Hire a counselor, professionally trained, to do professional work. It is not that the counselor can not be a good clerk, but he can be a better counselor if given the chance." Recent developments in the area of computer-assisted counseling indicate the computer will be used to relieve the counselor from time consuming clerical and peripheral counseling activities and thus enable him to devote more of his counseling day to facilitating human growth and helping students achieve their potential.

The various aspects of the problem under investigation are discussed in chapter two. Included in that chapter are the purpose of the study, definition of terms, hypotheses, and delimitations of the study. Chapter three presents a review of research literature pertinent to the problem under investigation.

The fourth chapter deals with procedures and research design while chapter five contains results of the study. The last chapter discusses findings and implications for future research.

CHAPTER II

THE PROBLEM

I. PURPOSE OF THE STUDY

The major objectives of this study were to design, develop, implement, and evaluate a computer-assisted counseling program to interview grade nine students in planning for grade ten. In addition, student acceptance of the computerized interview was appraised.

The study involved construction of a computer program to simulate a high school counselor's behavior in an interview with students planning their grade ten high school programs. The grade ten programs were planned on the basis of the students' interests and Easter marks. The computer program was designed so that the student related knowledge about himself to data about grade ten programs. Thereby, a body of information was created upon which his program decisions were based.

Perhaps the best way of describing this study is: In what way and to what extent can the computer-assisted interview be successfully integrated into the school counseling process?

II. NEED FOR THE STUDY

The annual report, prepared by the Harvard Graduate School (Information System for Vocational Decisions, 1967), notes that students should be encouraged to think of high school program planning as part of a vocational planning process. It is not uncommon for coun-

selors in these interviews to be busy answering questions governed by a concern as to the immediate decisions to be made ("What courses shall I take next year?") and the immediate interest of the student ("I am interested in Math."). Thus, the counselor is seen as both the source and interpreter of facts. But, the amount and quality of facts readily available to the counselor at the time of an interview is limited by his own knowledge and his school's resources.

There is need for some type of program which provides students with direct access to relevant facts without the direct intervention of the counselor. Consequently, instead of being both source and interpreter of facts, the school counselor would have responsibility of assisting students, who seek his aid, when interpretation is necessary. In effect, this would provide the counselor with more time to counsel students with problems other than those requiring transmission of facts.

III. DEFINITION OF TERMS

APL. APL is an abbreviation of "A Programming Language" (Iverson, 1962). This language was used in programming the computer-assisted educational planning interview.

APL Terminal. An APL Terminal is an IBM 2741 terminal, similar to a typewriter. The terminal is connected to an IBM 360/67 computer which is equipped with a time-sharing system allowing for simultaneous use of its capacities by a number of remote APL terminals.

Computer Interview. The computer interview refers to the computer-assisted educational planning interview involving a grade nine student and the computer. Communication between student and computer was conducted through the medium of an APL terminal.

Computer Model. A computer model is the computer program which simulated a school counselor's behavior in interviews with grade nine students planning their grade ten programs.

Grade Ten Program. The term grade ten program applies to the high school pattern and specific grade ten courses selected by the grade nine student.

Counselor Interview. A counselor interview is an educational planning interview involving the school counselor and student.

Interview. Interview denotes both computer and counselor interview.

Model Counselor. The expression "model counselor" refers to the counselor after whom the computer model was simulated.

IV. HYPOTHESES

1. There is no significant difference between programs planned by the computer and counselor modes of counseling.
2. The attitudes of the students toward each mode of counseling are not significantly different.

V. DELIMITATIONS OF THE STUDY

This study was limited to a sample of 30 grade nine students randomly selected from a large junior high school in the Edmonton Separate School District. The sample was divided randomly into two groups so that 15 students participated in the computerized interview and 15 in the counselor interview.

Three factors contributing to the small number of students in the sample were:

- (1) Interviews took place after Easter examinations. The intention was to interfere as little as possible with activities of students who, at that period of the school year, were concentrating on upcoming provincial departmental examinations.
- (2) Only 17 APL terminals were available for use in the interviews.
- (3) APL terminals operate during specified periods of the day. The best available time, after school, was between 4:00 and 6:00 P.M.

Another delimitation involved construction of the computer model. An attempt was made to simulate the behavior of a single school counselor. Emphasis was not upon a direct comparison of computer model with the school counselor, although final grade 10 plans made during both types of interview were rated by three judges. Rather, the study was

directed toward designing and evaluating the validity of the computer model.

CHAPTER III

REVIEW OF RELATED RESEARCH

Recently, there has been a proliferation of articles related to computers and their use in the field of education. However, there has been only one major research project related to computer-assisted counseling. The study (Cogswell and Estavan, 1965; Laughery, Friesen and Hurst, 1965; Cogswell, Donahoe, Estavan, and Rosenquist, 1966; and Rosenquist, Cogswell, Estavan and Donahoe, 1967) was carried out, in 1965, by the System Development Corporation,¹ a nonprofit organization involved in educational research and development.

The main aim of the SDC study was to explore the potential value of automated counseling for both field and research application in counseling. Major emphasis was placed upon showing "...that much of what counselors currently do can be characterized in an information-processing model, and to demonstrate that a computer could be validly modeled to perform the information-processing task" (Cogswell et al., 1966, pp. 3-4). Other objectives of the SDC study (Laughery et al., 1965, pp. 6-7) were to: (1) determine if some aspects of the counselor's pre-interview and interview behavior could be automated; (2) measure counselee attitudes toward computerized counseling; (3) test a method of analyzing counselor behavior; and (4) explore the possibilities of further use of counseling in related areas.

¹. Throughout the remainder of this paper, the initials SDC will be used to denote System Development Corporation.

The counseling area studied by SDC was the educational planning interview. An attempt was made to simulate the counselor's behavior in two phases of the educational planning interview: (1) the pre-interview behavior of the counselor in appraisal of students cumulative records; and (2) the counselor's behavior in the interview itself. Analysis of the two phases of counselor behavior was conducted for SDC by two groups of researchers. Cogswell and Estavan (1965) were responsible for the former and Laughery, Friesen and Hurst (1965) were responsible for the latter.

The SDC researchers decided to "model" their computerized counselor on the behavior of a single school counselor. A high school counselor, experienced in helping grade nine students in planning for high school, was selected as the "model counselor". The counselor was given the cumulative records of a random sample of 20 grade nine students unknown to him and asked to interview the students.² Before each interview the counselor would "think out loud" as he read each cumulative record, analyzed the data, and formed hypotheses about the student. Tape recordings were made of the counselor's pre-interview verbalizations as well as the conversations between student and counselor. The tapes were analyzed and two models of the counselor's decision rules were programmed. One model simulated his pre-interview behavior and the other model simulated the actual educational

². Cogswell and Estavan (1965, p. 5) report that the sample consisted of 20 students. On the other hand, Laughery et al., (1965, p. 8) indicate that 25 students were selected.

planning interview.

Upon completion of the computerized counseling system, the SDC researchers were interested in its validity. "The basic validity criterion," according to Laughery et al. (1965, p. 12), "was the similarity of pupil appraisal data and course decisions generated by the two counseling modes."

To test the validity of the system, a large junior high school in Palo Alto, California, was selected as the base for the study. A Model 31 teletype, connected via telephone line to an IBM Q-32 computer³ in Santa Monica, California, was installed in the school. Forty students were randomly divided into two groups of 20 students each. One group was assigned to the model counselor and the other group to a counselor from the junior high school. Each of the two groups was further divided into two sub-groups of 10. One sub-group from each group was first interviewed by the computer and then by the assigned school counselor. The other two sub-groups were first interviewed by the assigned counselor and then by the computer. The order of interview was altered for each sub-group as a precaution to offset order effects. Also, following each type of interview, the students answered a questionnaire designed to measure their attitudes toward the interview.

The results of the study (Cogswell and Estavan, 1965, pp. 9-10)

³. A large experimental computer with a time-sharing system.

are summarized in the following categories:

1. Areas of no difference between the school counselor and computer.

There was no significant difference between the appraisal behavior of the computer and the two school counselors on three-fourths of the appraisal statements.

"A simple correction to one of the rules in the program," according to Cogswell et al. (1966, p. 5), "would have greatly decreased the error."

2. Areas of difference between the school counselor and computer.

- a. In the pre-interview, the computer was generally more pessimistic in predicting the future achievement of students in the lower aptitude levels. It predicted more potential dropouts than did the school counselors.

- b. During the educational planning interview, the computer was more permissive than the school counselors. The students interviewed by the computer were not required to make a complete program of courses. The conclusion of the researchers was that the students were more influenced by the school counselors than by the computer in terms of the schedule produced.

- c. Some of the students favored the computerized interview

because they felt the confidentiality of the computer interview was very important.

3. Student reaction to the computer interview.

- a. Twenty per cent felt the computer was able to take into consideration all the data necessary to make adequate plans for high school.
- b. Fifty-six per cent had reservations about the computer-assisted plans. Twenty per cent had reservations about the course plans constructed with the assistance of the school counselor.
- c. Six per cent were bored by the computer interviews.
- d. Twenty-six per cent felt bothered by the fact that the computer did not express reassurance as to whether their choices were appropriate.
- e. One student terminated the computer interview before making grade ten course plans.

The SDC researchers concluded that computers are not a universal panacea to the problems in counseling but that they could perform a significant part of the processing and transmitting of data currently done by counselors. Speculation, by Laughery et al. (1966, p. 14), is that with the increasing use of computer-assisted counseling a different concept of counseling will evolve. Perhaps, with the increased use of computers, the entire field of education will undergo evolution. Both Stolurow (1966) and Coulson (1966) agree that the use of computers

in schools will require basic changes in educational thought and actions. Coulson (1966, p. 340) states that changes in education, due to use of the computer will occur because: "...the real contribution automation can make to education will be realized only when the basic organizations and structures of the school are altered to take advantage of the new data-processing technology."

Currently, an SDC research team (Cogswell et al., 1966) is exploring further uses of the computer in the field of counseling. The computer would be used to handle the major information processing tasks in the counseling operation. According to Cogswell et al. (1966, p. 1),

Plans include storage of all student data in the computer for easy processing and retrieval; tracking of students through their school progress by the computer to identify counseling problems; automated on-line generation and application of multiple prediction formulas; automated scheduling and automated generation of reports; and automated interviews to help the students in areas of course programming, post-high school educational planning and vocational exploration.

The researchers planned that in the spring of 1967 the information-processing applications would be developed and implemented. According to Cogswell et al. (1966, p. 9), "When the system has been implemented and operating smoothly, the final evaluation data will be collected for the project's third phase."

Computer-assisted counseling is not restricted to the field of education. Colby, Watt and Gilbert (1966) have been exploring the possible use of the computer in a type of psychotherapy for psychiatric patients for whom no human counselors are available. Their

aim is to develop a computer program capable of conversing with a patient. The technique has not yet been tried out on patients since further research and development is needed.

The above review of research literature indicates that computers are beginning to exert influence in the field of counseling. This review has shown that computer-assisted counseling can be incorporated into certain counseling functions. In essence, the SDC study demonstrated that it is possible to relieve the counselor of peripheral counseling activities. Therefore, the computer is expected to play a significant part in the changing role of the counselor.

CHAPTER IV

PROCEDURES AND RESEARCH DESIGN

I. THE SAMPLE

A random sample of 30 ninth-grade students was selected from a large junior high school in the Edmonton Separate School District. The subjects were randomly assigned to two groups of 15. One group, consisting of 5 girls and 10 boys, was interviewed by a counselor from the high school they would attend the following school year, while the other group, 6 girls and 9 boys, was interviewed by the computer.

The junior high school, from which the sample was selected, had an enrollment of more than 100 ninth-grade students. In this school, the junior high counselor devoted at least two-thirds of his school day to counseling activities. As well, he taught all four grade nine guidance classes.

II. THE MODEL COUNSELOR

In this study, the term "model counselor" does not infer that the counselor after whom the computer program was simulated was selected as best counselor on the basis of training and experience in the Edmonton Separate School District. Rather, the model counselor was selected on the basis of the following criteria:

- (1) he was, at the time, a counselor in the high school
which the students in the sample would attend the

following year.

- (2) he conducted educational planning interviews with grade nine students in the junior high school selected for this study.

III. THE COMPUTER MODEL

A major portion of this study involved the construction of a computer model of the model counselor's behavior in interviews with grade nine students planning their grade 10 programs. Since the high school had a policy of interviewing grade nine students from its feeder school after Easter examinations, it was not possible to observe the counselor in an actual educational planning interview. Therefore, an effort was made to simulate the counselor's interview behavior. He was presented with subject marks, indicated interests, and biographical data of five hypothetical students and asked to "think out loud" as he interpreted and analyzed the data. Next, he was asked to plan a tentative grade ten program for each hypothetical student. In addition this investigator interviewed the counselor and talked over topics that the model counselor felt were important to the educational planning interview and that should be discussed with the students.

Tape recordings were made of the counselor's verbalizations as he analyzed data about the hypothetical students as well as the dialogue between investigator and counselor. The tapes were trans-

cribed, analyzed, and a "rough" flow chart constructed to describe the counselor's decision making rules and his criteria in helping students plan their tenth-grade programs.

It should be noted that the method used to simulate the counselor's behavior in an educational planning interview was somewhat superficial due to the counselor's not being observed during an actual educational planning interview. There was no real interaction between counselor and student as a result the final grade 10 programs, prescribed for the student, were planned by the counselor solely on the basis of past recorded data.

IV. COMPUTER PROGRAM DEVELOPMENT

In order to describe the counseling procedures used in the computer program a copy of a sample interview is contained in Illustration 1, pages 20 to 27. The remainder of this section describes the sample interview contained in Illustration 1.

Illustration 1a (page 18). After a brief note on purpose of the interview, the student was instructed to type the letter Y. Due to a wrong input response, a message was issued by the computer asking the student to try typing Y again. Three successive errors would have caused a warning message to be typed indicating that another wrong response would terminate the interview. If a correct response was entered, the computer would respond by noting that the input was correct. Near the bottom of Illustration 1a, the reasons for typing Y

ILLUSTRATION 1a

SAMPLE COMPUTER INTERVIEW

HELLO.

YOU ARE ABOUT TO PARTICIPATE IN AN INTERVIEW WITH A COMPUTERIZED COUNSELOR. THE COMPUTER WILL HELP YOU PLAN YOUR GRADE 10 HIGH SCHOOL PROGRAM AS WELL AS DISCUSS WHAT YOU WANT TO DO IN HIGH SCHOOL AND LATER LIFE.

BUT FIRST, JUST TO LET THE COMPUTER KNOW YOU ARE THERE PLEASE TYPE THE LETTER Y AND THEN PRESS THE CARRIAGE RETURN KEY (THE LARGE RECTANGULAR KEY ON THE RIGHT HAND SIDE OF THE KEYBOARD).

U

YOU HAVE NOT TYPED Y. CHECK THE KEYBOARD, TYPE Y AND DO NOT FORGET THE RETURN KEY.

Y

EXCELLENT.

NOW, THE MOST IMPORTANT KEY IS THE RETURN KEY, WHEN YOU PRESS THE RETURN KEY, THIS LETS THE COMPUTER KNOW THAT YOU HAVE COMPLETED YOUR ANSWER.

JUST FOR PRACTICE TYPE THE LETTER N AND THEN PRESS THE RETURN.

N

O.K.

SOMETIMES YOU WILL BE ASKED TO ANSWER A QUESTION. IF YOU AGREE, TYPE THE LETTER Y TO MEAN YES. IF YOU DISAGREE, TYPE THE LETTER N TO MEAN NO. (DO NOT FORGET THE RETURN KEY).

WELL LET US TRY IT. HERE IS A QUESTION.

ARE YOU TAKING THIS INTERVIEW AT THE UNIVERSITY OF ALBERTA?

Y

CORRECT.

BY NOW YOU HAVE NOTICED THAT BEFORE YOU TYPE AN ANSWER, THE TYPEWRITER TYPES STARS LIKE THIS:

THIS IS TO LET YOU KNOW THAT IT IS TIME FOR YOU TO TYPE SOMETHING. DO NOT TYPE ANYTHING UNTIL THE COMPUTER HAS TYPED THE STARS.

DO YOU UNDERSTAND? (TYPE Y OR N)

Y

GOOD.

AT TIMES DURING THIS INTERVIEW, YOU WILL BE PRESENTED WITH QUESTIONS TO WHICH THERE ARE NO RIGHT OR WRONG ANSWERS. THE QUESTIONS WILL CONTAIN A NUMBER OF CHOICES.

YOU WILL BE ASKED TO SELECT THE CHOICE(S) YOU THINK ARE BEST.

I WILL NOW LET YOU ANSWER SUCH A QUESTION.

HERE IS A LIST OF SPORTING ACTIVITIES:

CODE	SPORT
1	HOCKEY
2	SKATING
3	CURLING
4	BASEBALL
5	SOFTBALL
6	FOOTBALL
7	BOWLING
8	TENNIS

IN HOW MANY OF THE ABOVE ACTIVITIES DO YOU PARTICIPATE? TYPE ONLY ONE NUMBER (FROM 1 TO 8). IF YOU DO NOT PARTICIPATE IN ANY ACTIVITIES, TYPE THE NUMBER 0.

2

TYPE THE CODE NUMBER CORRESPONDING TO YOUR:

FIRST CHOICE?

4

ILLUSTRATION 1c

SECOND CHOICE?

7

THE SPORTS YOU PARTICIPATE IN ARE:

BASEBALL

BOWLING

IF THE ABOVE ANSWER IS CORRECT TYPE Y . IF YOU
DISAGREE WITH THE ANSWER TYPE N AND I WILL LET YOU
TRY IT AGAIN.

Y

NOW THAT YOU KNOW HOW TO OPERATE THE TERMINAL, WE
ARE READY TO CARRY ON WITH THE INTERVIEW.

PLEASE TYPE YOUR CODE NUMBER.

6

ARE YOU CARL SMITH?

TYPE Y OR N .

Y

ACCORDING TO MY RECORDS, THESE WERE YOUR EASTER
REPORT CARD MARKS.

SUBJECT MARK

LITERAT.--60

LANGUAGE--50

SOC.ST.---50

MATH.-----55

SCIENCE---60

ART-----85

MUSIC-----A

AFTER YOU FINISH HIGH SCHOOL, DO YOU PLAN TO
CONTINUE YOUR FORMAL EDUCATION?

Y

FROM THE FOLLOWING LIST, SELECT THE ONE TYPE OF SCHOOL YOU PLAN TO ATTEND.

- 1 NAIT OR SAIT
- 2 NURSING SCHOOL
- 3 UNIVERSITY
- 4 I HAVE NOT DECIDED YET
- 5 NONE OF THE CHOICES APPLY TO ME

TYPE THE NUMBER OF YOUR CHOICE.

1

WOULD YOU LIKE SOME INFORMATION ABOUT NAIT OR SAIT?

Y

MOST OF THE TECHNOLOGY PROGRAMS AT NAIT REQUIRE AT LEAST TWO YEARS TO COMPLETE. FOR THE MAJORITY OF THE TECHNOLOGIES, THE ENTRANCE REQUIREMENT IS A HIGH SCHOOL DIPLOMA WITH AT LEAST B STANDING IN GRADE 12 MATHEMATICS.

ONE OF THE EXCEPTIONS TO THE ABOVE REQUIREMENT IS THE MEDICAL SCIENCE PROGRAM (LAB. TECH., RECORD LIBRARIAN, OR X-RAY TECH.). THE ENTRANCE REQUIREMENT TO THIS PROGRAM IS A TOTAL OF FIVE GRADE 12 MATRIC. SUBJECTS WITH AN OVERALL AVERAGE OF AT LEAST 60 PER CENT AND NO SUBJECT LESS THAN 50 PER CENT.

THE TYPE OF SCHOOL YOU WILL BE ABLE TO ATTEND AFTER HIGH SCHOOL WILL BE GREATLY DETERMINED BY THE MARKS YOU WILL RECEIVE IN HIGH SCHOOL.

LET US ASSUME THAT YOUR GRADE NINE DEPARTMENTAL MARKS WILL BE THE SAME AS YOUR PRESENT EASTER REPORT CARD MARKS.

IF SO, THEN HERE IS A LOOK AT HOW STUDENTS WITH MARKS LIKE YOURS DID IN HIGH SCHOOL.

90 PER CENT COMPLETED GRADE 10 (30 CREDITS OR MORE)
 63 PER CENT COMPLETED GRADE 11 (65 CREDITS OR MORE)
 30 PER CENT COMPLETED 100 CREDITS (OR MORE)
 26 PER CENT RECEIVED A HIGH SCHOOL DIPLOMA
 3 PER CENT OBTAINED MATRICULATION

NOW LET US DISCUSS A TENTATIVE GRADE 10 COURSE PLAN. HERE IS A LIST OF THE THREE HIGH SCHOOL PROGRAMS OFFERED AT ST. FRANCIS XAVIER.

1. BUSINESS(DIPLOMA)
2. GENERAL(DIPLOMA)
3. MATRICULATION

PLEASE SELECT THE PROGRAM YOU WOULD LIKE TO TAKE
NEXT YEAR.

2

YOUR CHOICE IS THE GENERAL(DIPLOMA) PATTERN?
(Y OR N)

Y

THE FOLLOWING ARE REQUIRED COURSES (EACH COURSE HAS
A VALUE OF 5 CREDITS)

ENGLISH 10
SOC.ST. 10
PHY.ED. 10

YOU ARE REQUIRED TO TAKE A MATH COURSE. HERE IS
A LIST OF THE GRADE 10 MATH COURSES OFFERED AT
ST. FRANCIS.

- 1 MATH 10
- 2 MATH 11
- 3 MATH 12

WOULD YOU LIKE INFORMATION ABOUT THE MATH COURSES?

Y

MATH 10- THE PREREQUISITE FOR THIS COURSE IS AT LEAST
B (50 PER CENT OR MORE) IN GRADE 9 MATH. THIS
MATH IS USUALLY TAKEN BY STUDENTS WISHING TO
GO TO UNIVERSITY OR TECHNICAL SCHOOL.

MATH 11- DESIGNED FOR STUDENTS ENTERING BUSINESS OR
CONSUMER OCCUPATIONS.

MATH 12- IS A FIRST MATH COURSE IN THE VOCATIONAL PATTERN.

TYPE THE CODE OF THE MATH OPTION OF YOUR CHOICE.

3

YOU HAVE CHOSEN MATH 12 ?

Y

YOU ARE REQUIRED TO TAKE A SCIENCE COURSE. HERE IS
A LIST OF THE GRADE 10 SCIENCE COURSES OFFERED AT
ST. FRANCIS.

1 SCIENCE 10

2 SCIENCE 11

WOULD YOU LIKE INFORMATION ABOUT THE SCIENCE COURSES?

N

TYPE THE CODE OF THE SCIENCE OPTION OF YOUR CHOICE.

1

YOU HAVE CHOSEN SCIENCE 10 ?

Y

TOTAL CREDITS = 2 5

IT IS GENERALLY RECOMMENDED THAT GRADE 10 STUDENTS
CARRY A COURSE LOAD OF AT LEAST 35 CREDITS, BUT NO
MORE THAN 40 CREDITS.

HERE IS A LIST OF THE OPTIONS YOU MAY CHOOSE FROM.
REMEMBER THAT EACH COURSE IS ASSIGNED 5 CREDITS.

1 ART 10

2 BOOKKEEPING 10

3 DRAMA 10

4 FAB-AND-DRESS 10

5 FRENCH 10

6 LATIN 10

7 TYPEWRITING 10

BEFORE YOU ACTUALLY CHOOSE YOUR OPTIONS, WOULD YOU
LIKE ANY INFORMATION ABOUT ANY OF THE OPTIONS?

Y

HOW MANY OF THE OPTIONS WOULD YOU LIKE INFORMATION ABOUT?

2

TYPE THE CODE NUMBER CORRESPONDING TO YOUR:

FIRST CHOICE?

1

SECOND CHOICE?

7

1. ART 10: IN THIS COURSE ONE STUDIES DESIGN, COLOR AND COMPOSITION, OUTDOOR SKETCHING, STILL LIFE AND FIGURE DRAWING.

7. TYPEWRITING 10: AN INTRODUCTORY COURSE. THIS COURSE IS A PREREQUISITE FOR TYPEWRITING 20 AND 30.

IT IS RECOMMENDED THAT STUDENTS TAKE ONLY 2 OPTIONS. A MAXIMUM OF 3 OPTIONS IS PERMISSABLE IF YOU HAVE A HIGH GRADE 9 AVERAGE.

HOW MANY OPTIONS WOULD YOU LIKE TO TAKE (2 OR 3)?

2

TYPE THE CODE NUMBER CORRESPONDING TO YOUR:

FIRST CHOICE?

9

YOUR ANSWER MUST CONTAIN ONE NUMERAL FROM 1 TO 7

TRY AGAIN.

FIRST CHOICE?

1

SECOND CHOICE?

7

ILLUSTRATION 1h

THEREFORE YOUR OPTIONS ARE:

ART 10
 TYPEWRITING 10
 TOTAL CREDITS = 35
 IS THIS CORRECT?

 Y

THIS IS WHAT YOUR PROPOSED PROGRAM LOOKS LIKE:

ENGLISH 10
 SOC. ST. 10
 PHY. ED. 10
 MATH 12
 SCIENCE 10
 ART 10
 TYPEWRITING 10
 TOTAL CREDITS = 35

CARL, WHEN THIS INTERVIEW IS COMPLETED, MR. ROMANIUK WILL GIVE YOU A PLANNING BOOKLET TO BE USED BY STUDENTS WHO WILL BE ATTENDING ST. FRANCIS XAVIER HIGH SCHOOL. ALSO, YOU WILL BE GIVEN THE PAPER ON WHICH THIS INTERVIEW IS NOW BEING TYPED.

PLEASE DISCUSS THE PROPOSED PROGRAM WITH YOUR PARENTS OR GUARDIANS. AFTER YOU HAVE DECIDED ON YOUR FINAL PROGRAM FILL IN THE PROGRAM FORM YOU WILL FIND IN THE BOOKET.

HAND THE COMPLETED FORMS TO MR. OSTASHEWSKI BY MONDAY.

I HOPE THAT THIS INTERVIEW HAS BEEN AN AID IN HELPING YOU PLAN YOUR GRADE 10 PROGRAM.

THANKS CARL, ITS BEEN NICE TALKING TO YOU.

TIME FOR:

1 LEARNING OPER.
 OF TERMINAL = 3.8 MINUTES
 2 INTERVIEW = 8.4 MINUTES
 3 TOTAL SESSION= 12.2 MINUTES

THIS INTERVIEW IS NOW COMPLETE. BEFORE YOU GO, I WOULD LIKE YOU TO ANSWER A QUESTIONNAIRE CONCERNING THIS INTERVIEW.

PLEASE CALL MR. ROMANIUK AND HE WILL INSTRUCT ME TO GIVE YOU THE QUESTIONNAIRE.

and N were explained.

At this point in the interview it was intended: (1) to keep student input relatively simple; (2) to give positive reinforcement to correct answers; and (3) to keep the student actively interacting with the computer.

Illustration 1b (page 19). The student's attention was focused on the set of stars typed immediately after an instruction or question requiring a student response. This was an attempt to have the student recognize that whenever the stars were typed a response was required.

If the student had typed N in response to the question asking whether he understood the reason for the set of stars being typed, the information regarding the stars would have been repeated but this particular question would not have been asked again. The last half of Illustration 1b attempts to have the student learn procedures required for selecting a number of choices from a given list of options.

Illustration 1c (page 20). After the student's options were input, the computer replied by printing the list of options chosen by the student. Precautions were taken to ensure that the student could repeat a particular sequence if he accidentally pressed a wrong key or changed his mind about an answer. This was done by asking the student if the computer listing of his answers was correct.

At this point, the instructional section of the interview was complete and the computer had recorded the time taken by the student

in learning how to use the APL terminal.

The program entered the educational planning portion of the interview and asked for the student's code number which had been issued prior to the beginning of the computer interview. Once the computer had verified the student's response against a master list, the interview proceeded along lines similar to those conducted by the model counselor during his interviews with five hypothetical students.

Illustration 1d (page 21). Students wishing to attend post-high school institutions were asked to select one of the institutions listed. NAIT and SAIT refer to the Northern and Southern Institutes of Technology respectively, in Alberta.

A brief resume of educational requirements for entry was provided if requested by the student. Those not anticipating attendance at a post-high school institution or who had not yet decided on a school were asked if they wanted information regarding apprenticeship training.

Then, based on a survey by the Department of Education, Province of Alberta (Applying grade IV results, 1963, pp. 1-2) probabilities of success in high school by ninth-grade students, with marks similar to those of the student being interviewed, were listed. It was hoped that the student would use information about educational requirements of a particular post-high school institution or trade, and probability of success in high school, to aid him in choice of

a high school pattern.

Illustrations 1e, 1f, and 1g (pp. 22-24). After selecting a high school pattern for the following year, the required courses for the particular pattern were listed. The student was then presented with a series of course options. This portion of the interview was programmed to give the student information about any option, if requested.

Near the bottom of Illustration 1f, immediately following the list of seven options, matriculation students were advised to choose French or Latin as one of their options.

Illustration 1h (page 25). A review of the student's options was output. Under the following conditions the student would have been given another chance to choose course options: (1) he changed his mind or accidentally typed the wrong option code number; (2) a male student had chosen Fabrics and Dress as one of his options; (3) both French and Latin were chosen as options.

Finally, a list of the student's proposed course load was typed. As well, the time taken to complete the two portions of the interview was indicated.

V. INTERVIEWS

In an attempt to prepare ninth-grade classes for the educational planning interviews, guidance classes at the junior high school

discussed and studied various patterns, course offerings, and extra-curricular activities available at the high school which the students would attend next year. Also, guidance classes focused on opportunities for post-high school education as well as educational requirements for post-high school institutions and various occupations. Study of these areas was completed before the educational planning interviews were held.

Since the junior high school counselor taught all four of the ninth-grade guidance classes, and both counseling groups were randomly selected from the four classes, this investigator assumed that both groups were exposed to similar educational planning information.

Originally, it was scheduled for the computer interviews to be held on the afternoon of Thursday, May 2, 1968; the counselor interviews on Friday, May 3, 1968; and the remainder of the grade nine class to be interviewed, by the high school counselor, on the following Monday and Tuesday. The group designated for the computer interview arrived at the University of Alberta at approximately 4:00 P.M. on the date scheduled but due to computer hardware problems, interviews were delayed one hour. The extra hour was used to show the students the IBM 1500 computer system located in the Education Building.⁴ At 5:00 P.M. the group walked to the Computing Science Building and waited an hour before being notified that problems with

⁴ The IBM 1500 computer is being used by the Division of Educational Research Services for research into computer-assisted instruction.

the computer system could not be rectified. The group left the University at 6:00 P.M.

On the following day, Friday, the computer system was still not operation. This investigator met with students designated for the computer interview and explained reasons for the delay. The students appeared to be disappointed but voted to take the interview on Monday, May 6, 1968. Finally, the interviews were carried out without any problems. The interviews conducted by the high school counselor were held on the days originally scheduled.

Upon completion of their educational planning interviews, students from both groups answered a questionnaire designed to measure their attitudes toward the interview.

Computer Interview

The initial phase of the interview was a brief three to six minutes computer-based instructional program in use of the APL terminal, followed by the educational planning interview.

A record of the interview was obtained by using 10" x 11" two-copy continuous paper in the APL terminals. One copy was given to the subject and the other copy retained by the investigator.

The subjects, after being given a chance to examine their proposed programs, answered the attitude questionnaire which was administered by the computer. Before leaving for home the subjects were given a high school planning booklet containing information

about the high school which they would attend next year. Contained in the booklet was information about student activities, course patterns, various courses offered at each grade level, and credit requirements for entrance into various post-high school institutions. Also included in the booklet was a form which the student filled in with his proposed program. The students were then asked to take their booklets home and discuss the proposed program with their parents. Earlier the students and their parents had been notified, by letter, that if they wished to have the proposed program changed they could do so in consultation with the high school counselor.

Counselor Interview

Students from the counselor group were individually interviewed by the high school counselor on Friday, May 3, 1968. At the beginning of the interviews each student was provided with a high school planning booklet. With aid of the counselor and a planning booklet, the student prepared a tentative grade ten course program. After the interview each student met with this investigator and answered the attitude questionnaire.

VI. INSTRUMENTS

Rating Scale

1. Design. A rating scale was constructed to measure the

acceptability of the 30 proposed high school programs. This type of scale is often referred to as a "graphic rating scale" (Selltitz, Jahoda, Deutsch, and Cook, 1965, p. 345). The scale consists of a continuum with five scale points located at equal intervals along the continuum. Rather than forming boundaries for distinct categories, the scale points served as a guide to the judge in localizing his ratings. The judges rated the acceptability of the programs based on the rating form illustrated in Appendix C.

2. Judges. Three judges rated the programs. The judges were the high school counselor (model counselor), the junior high school counselor and the Supervisor of Pupil Personnel in the Edmonton Separate School District.

3. Procedure. After subjects completed their grade ten programs, the programs were typed on forms identical to the one in Appendix C. Also included on the forms were students' Easter marks and a rating scale. Code numbers were used in place of students' names. The forms were arranged in random order and then, two weeks after the computerized interviews were completed, were presented to each of the judges independently.

The judges rated each program by assigning it a position along the continuum, to the nearest half scale point. Displayed in Table I are ratings assigned to the computer group and in Table II, ratings given the counselor group.

TABLE I

RATINGS ASSIGNED TO GRADE TEN
PROGRAMS OF COMPUTER GROUP

Student	High School Counselor	Supervisor of Pupil Personnel	Junior High Counselor
1	1.0	2.5	1.5
2	2.5	4.5	2.0
3	5.0	2.0	4.0
4	5.0	5.0	3.0
5	4.5	5.0	2.0
6	3.0	4.0	4.5
7	3.5	4.0	2.5
8	5.0	4.5	4.0
9	4.5	5.0	4.0
10	5.0	2.5	4.5
11	4.5	2.5	4.0
12	4.5	5.0	4.5
13	2.0	1.5	2.0
14	4.5	4.5	4.5
15	3.5	5.0	3.5
TOTAL	58.0	50.0	57.5

TABLE II

RATINGS ASSIGNED TO GRADE TEN
PROGRAMS OF COUNSELOR GROUP

Student	High School Counselor	Supervisor of Pupil Personnel	Junior High Counselor
1	4.5	3.5	3.5
2	5.0	3.5	3.5
3	4.5	4.0	4.5
4	5.0	4.0	4.5
5	4.5	5.0	4.0
6	5.0	1.5	4.0
7	4.5	4.5	2.5
8	5.0	3.0	3.5
9	4.0	4.5	2.5
10	3.0	3.0	2.5
11	4.5	4.0	2.5
12	4.5	4.5	2.0
13	4.0	4.5	3.0
14	5.0	4.5	4.5
15	5.0	4.5	4.5
TOTAL	68.0	51.5	58.5

After the programs had been rated, each judge was asked to give his criteria of a program rated 5 and that of a program rated 1.

Attitude Questionnaire

The questionnaire used in this study consisted of 15 items designed to measure student attitudes toward both modes of counseling. Students were required to respond to each item in terms of five categories of agreement or disagreement. This type of questionnaire is often referred to as a "Likert-type scale" (Selltiz et al., 1965, p. 366).

Both groups were administered identical questionnaires with exception of five items. In these five items, the word computer was used in place of the word counselor which was contained in the questionnaire given the counselor group. The counselor questionnaire is illustrated in Appendix C while a sample computer questionnaire is illustrated in Appendix D.

Numerical values assigned to items ranged from one point for checking strongly disagree to five points for strongly agree. Questionnaire items were constructed so that a few were positively directed, some negatively directed, and others neutral toward the interviews. Shown in Tables III and IV are item scores for the two counseling groups.

TABLE III

QUESTIONNAIRE ITEM SCORES FOR THE COMPUTER GROUP

Student	Item														
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)
1	4	1	2	4	2	1	1	4	4	3	5	1	4	3	2
2	4	1	2	4	2	2	1	3	2	2	4	1	5	2	3
3	4	1	3	4	3	3	2	3	3	3	5	1	4	1	2
4	4	1	4	5	4	2	3	2	4	3	4	1	4	2	1
5	4	2	2	4	2	2	1	4	4	2	5	2	5	1	1
6	3	1	2	4	2	2	1	3	2	3	4	2	4	3	2
7	4	1	4	4	2	2	1	3	3	3	5	1	4	4	1
8	3	1	3	4	2	3	1	3	3	3	5	1	4	2	1
9	4	1	1	5	2	2	1	4	4	2	5	1	5	1	2
10	5	1	2	5	1	4	1	4	5	4	5	1	1	4	5
11	3	1	2	5	1	3	1	5	3	2	5	1	5	1	2
12	3	2	4	5	2	2	1	3	4	2	5	1	5	2	2
13	2	1	4	5	3	2	1	3	4	5	5	1	5	2	3
14	3	1	1	5	1	5	1	5	4	1	5	1	5	2	1
15	4	1	2	5	2	4	1	5	1	2	5	2	5	3	1

TABLE IV

QUESTIONNAIRE ITEM SCORES FOR THE COUNSELOR GROUP

Student	Item														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	4	2	1	1	1	4	1	5	4	1	5	2	5	1	1
2	3	2	4	4	2	2	2	3	2	3	3	2	3	3	3
3	5	1	4	3	4	1	1	5	4	1	5	1	5	1	2
4	5	2	4	3	2	3	2	4	3	2	4	2	4	2	2
5	3	1	3	1	1	1	1	3	5	3	4	1	5	1	1
6	3	1	1	3	3	1	1	5	4	1	4	1	5	2	1
7	2	1	2	5	2	1	1	4	4	2	4	2	4	3	1
8	4	1	3	2	2	1	1	5	4	3	4	1	4	1	1
9	4	1	4	3	1	2	1	4	2	2	4	1	5	2	1
10	2	1	4	5	1	4	1	5	4	1	4	1	5	1	1
11	3	2	4	2	2	2	2	3	4	4	4	1	5	4	3
12	3	1	1	1	2	3	2	5	4	2	4	2	5	2	1
13	4	1	1	5	4	1	1	1	4	4	5	1	5	1	5
14	3	1	3	3	4	1	3	3	4	4	4	2	5	2	1
15	4	1	3	4	1	1	1	4	5	1	5	1	5	2	1

VII. STATISTICAL ANALYSIS

The IBM 360/67 computer of the University of Alberta was used to facilitate analysis of the data.

A principal purpose of this study was to build a valid computer model by simulating the educational planning behavior of a model counselor. To test the validity of the computer model, three sets of rating scores assigned to each proposed grade ten program were used as the dependent variable in an analysis of variance design. The design used in testing the first hypothesis -- that there is no difference between the grade ten programs planned by each mode of counseling -- is a two-factor experiment with repeated measures on one factor (Winer, 1965).

To test the second hypothesis -- that the attitudes of the students towards each type of interview are not significantly different -- Hotelling's T^2 test was used on the item scores of the questionnaires (Morrison, 1966).

CHAPTER V

RESULTS OF THE INVESTIGATION

In this chapter, results of the investigation are presented in three sections. The first assesses the simulation of the model counselor's behavior in an educational planning interview. The second part of this chapter appraises students' attitudes toward both modes of counseling while the third section examines time taken to complete the interviews.

I. COUNSELOR SIMULATION

Displayed in Table V is a summary of a two-way analysis of variance, with repeated measures on one factor, carried out on ratings of grade ten programs by three judges. Using 0.05-level of significance, with degrees of freedom 1 and 28, the critical F ratio of 4.20 was used in testing Hypothesis I, that there was no significant difference between programs produced by the two modes of counseling. The observed F ratio of 1.085 was below the critical value, therefore, the decision was NOT to reject Hypothesis I.

Also, using a critical F ratio of 3.17, with degrees of freedom 2 and 56, it was found that there was NO significant interaction between judges and type of program but there was a significant difference between judges' ratings of the programs. In Table VI, Newman-Keuls procedure was used in testing differences between ratings

TABLE V
ANALYSIS OF VARIANCE OF RATINGS
OF STUDENT PROGRAMS

Source of Variation	SS	df	MS	F
<u>Between Subjects</u>	<u>46.558</u>	<u>29</u>		
A (mode of counseling)	1.736	1	1.736	1.085
Subjects within groups	44.822	28	1.601	
<u>Within Subjects</u>	<u>53.167</u>	<u>60</u>		
B (judges)	10.117	2	5.058	6.851*
AB	1.706	2	0.853	1.155
Bx subjects within groups	41.344	56	0.738	

* $F_{.95}(2,56) = 3.17$

TABLE VI

TESTS ON MEANS USING NEWMAN-KEULS
PROCEDURE

Judges	b_2	b_3	b_1
Ordered means	3.383	3.867	4.200
Differences between means . .	b_2	b_3	b_1
	b_2	0.484	0.817
	b_3		0.333
$S_B = 0.157$			
$q_{.95}(r, 56):$			
$S_B q_{.95}(r, 56):$			
Significance at .05-level . .	b_2	b_3	b_1
	b_2	*	*
	b_3		-

b_1 : High School Counselor

b_2 : Supervisor of Pupil Personnel

b_3 : Junior High School Counselor

assigned programs by the three judges. This test shows that the Supervisor of Pupil Personnel rated programs significantly lower than did the two school counselors.

Winer (1962, p. 370) indicates that one assumption of analysis of variance with repeated measures is that the covariance matrices are random samples from populations in which the covariance matrices are equal. Using data from Table VII, the following computations were carried out to test the hypothesis that covariance matrices S_1 and S_2 were random samples from populations in which the covariance matrices are $\Sigma_1 = \Sigma_2 = \Sigma$:

p = number of groups (2)

q = number of judges (3)

n_k = number of subjects in group k (15)

N = total number of subjects in sample (30)

$|S_k|$ = determinant of the observed covariance matrix for group k

$|S_1| = 1.471$

$|S_2| = 0.121$

$|S_{\text{pooled}}| = 0.633$

$M_1 = N \ln |S_{\text{pooled}}| - \sum_{i=1}^p n_i \ln |S_i|$

$M_1 = 12.209$

$C_1 = \frac{2q^2 + 3q - 1}{6(q+1)(p-1)} \left[\sum_{i=1}^p \frac{1}{n_i} - \frac{1}{N} \right]$

$= 0.108$

TABLE VII

COVARIANCE MATRICES OF JUDGES' RATINGS

		b_1	b_2	b_3
S_1	b_1	1.552	0.851	0.494
	b_2	0.851	1.131	0.185
	b_3	0.494	0.185	1.595
S_2	b_1	0.302	0.288	-.032
	b_2	0.288	0.781	-.061
	b_3	-0.32	-.061	0.793
S_{pooled}	b_1	0.927	0.570	0.231
	b_2	0.570	0.956	0.062
	b_3	0.231	0.062	1.194

S_1 = 3 x 3 matrix of covariances for computer group

S_2 = 3 x 3 matrix of covariances for counselor group

S_{pooled} = 3 x 3 matrix of pooled covariances

$$f_1 = \frac{q(q+1)(p-1)}{2}$$

$$= 6$$

$$\chi_1^2 = (1-C_1)M_1$$

$$= 10.886$$

The critical value for a test of homogeneity of population covariance matrices, at the 0.05-level, is $\chi_{.95}^2(6) = 12.6$. Since the observed chi-square statistic did not exceed the critical value, the hypothesis of homogeneity of covariance was not rejected.

Non-rejection of the above hypothesis permitted pooling of the observed covariance matrices. Thus, S_{pooled} was used as an unbiased estimate of Σ , the population covariance matrix.

Another assumption is that Σ has the following form:

$$\Sigma = \begin{bmatrix} \sigma^2 & \rho\sigma^2 & \rho\sigma^2 \\ \rho\sigma^2 & \sigma^2 & \rho\sigma^2 \\ \rho\sigma^2 & \rho\sigma^2 & \sigma^2 \end{bmatrix}$$

If S_{pooled} has the above form, then the matrix

$$S_0 = \begin{bmatrix} \overline{\text{var}} & \overline{\text{cov}} & \overline{\text{cov}} \\ \overline{\text{cov}} & \overline{\text{var}} & \overline{\text{cov}} \\ \overline{\text{cov}} & \overline{\text{cov}} & \overline{\text{var}} \end{bmatrix}$$

where $\overline{\text{var}}$ = mean of elements on main diagonal of S_{pooled} ,

$\overline{\text{cov}}$ = mean of the off-diagonal elements of S_{pooled} ,

provides an unbiased estimate of Σ .

Using the data from Table VII

$$S_o = \begin{vmatrix} 1.026 & 0.288 & 0.288 \\ 0.288 & 1.026 & 0.288 \\ 0.288 & 0.288 & 1.026 \end{vmatrix}$$

To test the hypothesis that Σ has the form given above, the variables $|S_{\text{pooled}}|$, $|S_o|$, N , p , and q which are defined on pages 42 and 44 were used to compute the following statistics:

$$|S_{\text{pooled}}| = 0.633$$

$$|S_o| = 0.873$$

$$M_2 = -(N-p) \ln \frac{|S_{\text{pooled}}|}{|S_o|}$$

$$= 8.994$$

$$C_2 = \frac{q(q+1)^2(2q-3)}{6(N-p)(q-1)(q^2+q-4)}$$

$$= 0.054$$

$$f_2 = \frac{q^2+q-4}{2}$$

$$= 4$$

$$\chi_2^2 = (1-C_2)M_2$$

$$= 8.512$$

The critical chi-square value for a 0.05-level test on the hypothesis that all diagonal elements of Σ are σ^2 and all off-diagonal elements are $\rho\sigma^2$ is $\chi^2_{.95}(4) = 9.5$. These data did not contradict this hypothesis.

II. ATTITUDES OF STUDENTS

Hotelling's T^2 statistic (Morrison, 1966, pp. 125-128) was used in appraising students' responses to the attitude questionnaire.

A major advantage of the T^2 statistic is that it yields a simultaneous comparison of responses of the two groups on all 15 dependent variables rather than requiring development of a composite score for the 15 dependent variables. Also, there was no need to reverse the scores of negatively directed items because the T^2 statistic is unaffected by changes or shifts in origin of the response variates.

T^2 and F statistics were calculated using the following procedure:

k = number of groups (2)

N_k = number of subjects in group k (15)

N = total number of subjects (30)

$X_{(k)pi}$ = score assigned to item k , by person p , in group k

$X_{(k)}$ = 15 x 15 matrix of scores of 15 individuals on 15 items

for group k . The $X_{(k)}$ matrices are shown in Tables III and IV.

$\bar{X}_{(k)}$ = 1 x 15 vector of mean item scores for group k, shown in Table VIII.

$SS_{(k)} = (X_{(k)pi} - \bar{X}_{(k)i})(X_{(k)i})$. This is a 15 x 15 matrix of deviation score sum of squares and cross products for group k, shown in Table XVI and XVII.

$S = \frac{\sum SS_{(k)}}{N-2}$, shown in Table XV.

$$T^2 = \frac{N_1 N_2}{N} (\bar{X}_1 - \bar{X}_2)' S^{-1} (\bar{X}_1 - \bar{X}_2)$$

$$F = \frac{N_1 + N_2 - i - 1}{(N_1 + N_2 - 2) i} T^2$$

The T^2 statistic had the value 79.928; the observed F was 2.664 with degrees of freedom 15 and 14. Under the hypothesis of equal mean vectors, the critical value for F at the 0.05-level was 2.46. The decision was to reject Hypothesis II.

Although Hypothesis II was rejected, we still did not know which of the 15 mean differences may have contributed to the significant T^2 . It was not proper to perform a t-test on each of the individual mean differences since there would have been a possibility for individual mean differences to be spuriously significant because of the non-independence among the tests. Application of individual t-tests would have raised the level of significance from 0.05 to

TABLE VIII

QUESTIONNAIRE ITEM ITEMS AND
STANDARD DEVIATIONS

Item	Means		Standard Deviations	
	Computer ($\bar{X}_1$)	Counselor ($\bar{X}_2$)	Computer	Counselor
1	3.60	3.47	0.71	0.88
2	1.13	1.27	0.34	0.44
3	2.53	2.80	1.02	1.22
4	4.53	3.00	0.50	1.37
5	2.07	2.13	0.77	1.09
6	2.60	1.87	1.02	1.09
7	1.20	1.40	0.54	0.61
8	3.60	3.93	0.88	1.12
9	3.33	3.80	1.01	0.83
10	2.67	2.27	0.94	1.12
11	4.80	4.20	0.40	0.54
12	1.20	1.40	0.40	0.49
13	4.33	4.67	1.01	0.60
14	2.20	1.87	0.98	0.88
15	1.93	1.67	1.06	1.14

approximately 0.54. This means that the probability of rejecting a true null hypothesis in at least 1 of the 15 t-tests would have been 0.54. Therefore, simultaneous confidence intervals were used to test individual differences thereby maintaining the 0.05-level of significance.

The simultaneous confidence intervals for mean differences are defined by:

$$\begin{aligned}
 & \bar{a}^1(X_1 - X_2) - \sqrt{\bar{a}^1 S_a \frac{N_1 + N_2}{N_1 N_2} T_{\alpha; i, n_1 + n_2 - i - 1}} \\
 & \leq \bar{a}^1(\mu_1 - \mu_2) \leq \\
 & \bar{a}^1(X_1 - X_2) + \sqrt{\bar{a}^1 S_a \frac{N_1 + N_2}{N_1 N_2} T_{\alpha; i, n_1 + n_2 - i - 1}}
 \end{aligned}$$

Displayed in Table IX are simultaneous confidence intervals for the questionnaire item scores. Since each interval includes zero, the conclusion was that none of the pairs of item means were significantly different at the 0.05 joint significant level.

In view of the fact that none of the pairs of item means were significantly different, even though there was a significant difference between group centroids, a factor analysis was carried out on item responses for each group. The factor analysis was used to determine whether or not common clusters of items existed across

TABLE IX

ABSOLUTE DEVIATION OF MEANS AND SIMULTANEOUS
CONFIDENCE INTERVALS FOR DIFFERENCES
BETWEEN PAIRS OF ITEM MEANS

Item	Absolute Deviation of Means	Lower Confidence Limit	Upper Confidence Limit
1	0.13	-2.48	2.74
2	0.13	-1.42	1.15
3	0.27	-3.93	3.40
4	1.53	-1.81	4.88
5	0.07	-3.13	3.00
6	0.73	-2.69	4.16
7	0.20	-2.08	1.68
8	0.33	-3.61	2.94
9	0.47	-3.48	2.54
10	0.40	-2.97	3.77
11	0.60	-0.95	2.15
12	0.20	-1.65	1.25
13	0.33	-3.03	2.36
14	0.33	-2.70	3.37
15	0.27	-3.31	3.84

groups. By clustering items it may have been possible to determine more exactly which clusters of items contributed to the difference of group centroids. Varimax rotated loadings are tabulated in Tables XI and XII of Appendix A.

Next a factor match was carried out on the rotated factor loadings of both groups. This is analagous to a test of goodness of fit between loadings. Displayed in Table XIV of Appendix A are angles of rotation required to match factors of the counselor group with that of the computer group. Finally an attempt was made to predict factor loadings for the counselor group from factor loadings of the computer group. Table XIII of Appendix A contains predicted factor loadings of the counselor group. Results indicated that even after rotation, predicted loadings for the counselor group, in Table XIII, do not seem to occupy the same space as the original described in Table XII.

Therefore, it was decided that clusters of items common to both groups could not be found. The factor analysis further suggests that the groups differed in their perceptions of the questionnaire items.

III. LENGTH OF INTERVIEWS

Displayed in Table X is a tabulation of the time taken to complete the computer interviews. It is noted that the time taken in learning how to operate terminals ranged from 3.6 to 6.5 minutes.

TABLE X

TIME IN MINUTES TO COMPLETE
COMPUTER INTERVIEWS

Student	Learning Operation of Terminal	Educational Planning Inter.	Total Time
1	4.8	6.1	10.9
2	5.3	7.2	12.5
3	5.2	6.2	11.4
4	3.4	6.4	9.8
5	4.1	6.3	10.4
6	3.6	9.3	12.9
7	4.8	9.2	14.0
8	4.4	11.5	15.9
9	4.4	10.7	15.1
10	4.9	7.9	12.8
11	4.2	7.2	11.4
12	4.3	8.3	12.6
13	5.1	7.3	12.4
14	6.5	6.6	13.1
15	3.9	6.8	10.7
MEAN	4.59	7.80	12.39
S.D.	0.77	1.68	1.71

The mean learning time was 4.6 minutes.

With times ranging from 6.1 to 11.5 minutes, the mean completion time for the educational planning portion of the interview was 7.8 minutes. On the other hand, counselor interviews required a mean completion time of approximately 10 minutes.

CHAPTER VI

FINDINGS AND IMPLICATIONS FOR FUTURE RESEARCH

In review, the major objective of this study was to construct a computer program to duplicate the educational planning behavior of a high school counselor. Adequacy of the computer program in simulating the school counselor was measured by having three judges independently rate the acceptability of grade ten programs produced by both modes of counseling. Another objective was to measure student attitudes toward both types of counseling. Attitudes were measured by a questionnaire.

I. FINDINGS

Hypothesis one. There is no significant difference between programs planned by the computer and counselor modes of counseling. (Accepted)

Hypothesis two. The attitudes of the students toward each mode of counseling are not significantly different. (Rejected)

II. DISCUSSION

The findings show that the major objective of this study was achieved. It is possible to use a computer to simulate the behavior of a school counselor in an educational planning interview.

Even though programs produced by the two modes of counseling

were not significantly different, there were some interesting secondary findings. Results indicated there was a significant difference between judges in their mean ratings of programs. Several reasons may account for this difference. Examination of criteria used by the judges in rating programs showed the Supervisor of Pupil Personnel gave the lowest mean rating. This was due to the fact that he thought students entering the matriculation pattern should have an average of at least 65 per cent. Also, the Supervisor of Pupil Personnel and the junior high school counselor both agreed that a course load of 40 credits was too heavy for students with average mark less than 65 per cent.

Another factor that may have contributed to the difference between mean judge ratings was that both school counselors were in their first year of counseling. All three judges, however, taught school previous to entering the field of counseling.

The analysis of variance of ratings of student programs, displayed in Table V, shows no significant interaction between judges and mode of counseling at the .05-level. This finding indicated that the high school counselor (model counselor) could not distinguish between student programs constructed under his guidance and those programs constructed by students who were aided by the computer.

A common complaint voiced by the judges was that program rating was quite difficult. The complaint stemmed from the fact that programs were rated solely on the basis of students' Easter marks. The

judges suggested that more biographical data about each student were needed in order to make valid program ratings.

In testing Hypothesis two, Hotelling's T^2 statistic showed there was a significant difference between group centroids which represent group attitudes. A test of the simultaneous confidence intervals for corresponding pairs of item means disclosed there were no significant differences between any pairs of item means. Non-significance was due, in part, to the fact that the a posteriori test was very conservative. That is, because of the large number of pairs tested, a wide difference between pairs of item means was required for significance.

In an attempt to find the cause of non-significance of differences between corresponding item means, item responses were factor analyzed. Results of the factor analysis indicated there were no common clusters of items across groups. This means that a set of items highly loaded on one factor of the computer group could not be found intact in any of the three factors of the counselor group. Finally, in an effort to find the relationship between factors from one group with those of the other group, a factor match was carried out on the rotated factor loadings. The factor match disclosed that best fit occurred between factor one in the computer group and factor two in the counselor group. To obtain this particular fit, a rotation of approximately 22 degrees was required. Poor matching of factors could be accounted for by instability of the factor analysis

due to the small number of subjects in each group.

The question that remains to be answered is why did the two groups differ in their perceptions of questionnaire items? The data indicate the counselor group was more variable in their attitudes toward the interview than was the computer group. It should be remembered that the counselor group worked with a human counselor while the computer group worked with a machine. Conceivably, attitudes of the counselor group were more variable due to students responding subjectively toward the counselor interview. The computer group, perhaps, viewed the machine objectively and therefore were more consistent in their attitudes toward the interview.

Another suggestion is that the computer group was less variable in attitude due to the novelty of the situation. But, it may be argued, postponement of the original interview may have countered any novelty effect.

Although none of the pairs of corresponding questionnaire item means were significantly different, the fourth item provided the largest difference. This item measured attitudes toward the statement that students would have liked assurance as to correctness of their choices. The computer group strongly agreed they would have liked the computer to tell them their choices were correct. This need for assurance may possibly be accounted for by reinforcement given correct student responses in the instructional portion of the interview. Later, in the educational planning portion, no evaluative

statements were issued by the computer in response to choice of pattern or options. In the counselor interview, however, it is feasible to assume that students felt a lesser need for reassurance due to the counselor's non-verbal methods of communicating evaluations regarding correctness of choice.

It should be noted that some questionnaire items were positively directed, others negatively directed, and a few were neutral. Since there was no difference between corresponding pairs of item means, it could not be concluded that any one group was more favorable in their attitudes toward the interview than was the other group.

A point of interest is the average time taken to complete both types of interview. Mean time for the computer interview was 12.4 minutes with the education planning portion accounting for 7.8 minutes. Approximately 10 minutes were required to complete an average counselor interview. Times for the computer interview varied from subject to subject depending upon pattern selected, options chosen, and particularly amount of information requested.

Perhaps this would be an opportune place to discuss a few of the very limited drawbacks of using APL in programming interviews similar to this one. One restraint is the limited size of computer memory allowed each user. Alphabetic material, such as was used in this program, requires a fairly large amount of memory. Due to restricted allotment of memory, this computerized counseling program was rewritten on two occasions. Another disadvantage pertains to the

monotony that sets in when reading a long sequence of computer output. Since the APL terminal resembles a typewriter, the student must wait for the information to be typed before being able to respond. Finally, the terminal typed at a rapid speed. This presented difficulty to some students in that they were not able to read as fast as the terminal typed the information.

III. COUNSELING IMPLICATIONS

Although this study has demonstrated that computers could be used to perform certain peripheral counseling functions, further research is required in this area. Due to the small sample, results of this study remain somewhat inconclusive until replication with larger groups has been carried out. It would be important to use at least four groups, each containing a minimum of 30 subjects.

Format and method of questionnaire presentation should perhaps be investigated. With the exception of the words counselor and computer being interchanged, questionnaire items administered to both groups were identical. But, there was a difference in the method of questionnaire administration. The computer subjects took their questionnaire on the terminals while the counselor subjects were given a pencil and paper type questionnaire. Also, the five response items were differently arranged in the two types of questionnaire. In the computer interview, choices were presented in five rows descending from strongly disagree to strongly agree. On the other hand, response

options for the counselor group were displayed in columnar form with strongly disagree on the extreme left and strongly agree on the extreme right.

With four groups, it might be possible to study both the effects of questionnaire format and method of administration. This could possibly be done by assigning two groups to the counselor and the other two the computer. Of the two counselor groups, each would be given a different questionnaire format. Likewise, the same would be done with the computer group. This would permit a look at the effects of using different formats within a particular mode of counseling as well as the difference in attitudes toward mode of counseling by groups using the same format.

A final and perhaps most important implication concerns the moral and ethical implications of computer-assisted counseling. What types of student data will be programmed? Who will have access to the data? Will information processed between counselor and individual be regarded as privileged information? These are but a few of the questions counselors must ask themselves as they anticipate the introduction of computers into the field of counseling. It would appear that they must become increasingly aware of changes taking place as well as the part they should play in guiding the direction of innovations in their field.

IV. PROGRAMMING IMPLICATIONS

In the next few years, it is highly probable that much research will be conducted into the uses of computers in counseling. Computers likely will become an integral part of the counseling process. This means that counselors could benefit from a knowledge of basic fundamentals of computer programming.

Until recently most programming languages have been oriented toward mathematics and the sciences. But if computers are to be used in counseling, then conversationally oriented languages are required. Such a programming language is APL. It is simple to learn, very versatile, and particularly useful for computer-assisted counseling. The language can be learned quickly because of its likeness to conversational language. This investigator was introduced to APL in October, 1967 and by February, 1968 had programmed portions of the instructional interview.

APL can be programmed by punched cards or remote terminals. These terminals are extremely versatile in that they can be connected to the computer via telephone line. Therefore, if a school board operates a computer center, schools with terminals could use the computer facilities by simply dialing the center. The number of terminals that could be accommodated would be dictated by the size of the computer.

Another computer currently being experimented with at the

University of Alberta is the IBM 1500 System. With this system, each instructional station includes a TV-like display screen with an input keyboard, a projector that shows black and white and full color film images, and a light pencil that can be used for student responses. It is expected that within six months a magnetic tape unit that plays and records audio messages will be added to the system. As a counseling aid, this system is perhaps more adaptable than APL 360/67 in its capacity to present varying types of visual and audio information

V. FEASIBILITY FOR USE IN SCHOOLS

Presently, due to the high cost of operating a computing system, it is unlikely that a school district would install a computer solely for computer-assisted counseling. If a school district already possesses a computer then it may be possible through "time-sharing" to use the computer for computerized counseling as well as computer-assisted instruction.

School districts contemplating the use of a computer should attempt to obtain a system which can later be expanded for remote terminal use. Those school districts that already possess a computer probably use their computer mainly for data processing. Perhaps consideration should be given to computerized counseling or computer-assisted instruction during the small periods of time (fractions of a second) when regular work is not being done by the computer. The rate of response from the student terminals is so slow relative to

the computer speed that terminal work may be handled during small intervals of time while the computer is being engaged in a non-computing activity.

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A P P E N D I X A

TABLES XI - XVII

TABLE XI

VARIMAX ROTATED FACTOR MATRIX OF QUESTIONNAIRE
ITEM RESPONSES FOR COMPUTER GROUP

Item	Factor			h^2
	I	II	III	
1	.117	.573	.150	.364
2	.002	-.467	-.097	.228
3	-.781	-.046	-.224	.662
4	.234	-.141	-.580	.411
5	-.890	-.158	.083	.824
6	.628	.120	-.146	.430
7	-.671	-.019	-.016	.451
8	.939	-.112	-.043	.895
9	-.080	.088	-.816	.679
10	-.524	.522	-.332	.657
11	.478	-.162	-.535	.542
12	.223	-.081	.674	.510
13	.043	-.889	.253	.856
14	.041	.766	.111	.600
15	.074	.655	-.424	.614
Total Variance	3.764	2.739	2.222	8.723
Proportion of total variance	.251	.183	.148	.582

TABLE XII

VARIMAX ROTATED FACTOR MATRIX OF QUESTIONNAIRE
ITEM RESPONSES FOR COUNSELOR GROUP

Item	Factor			h^2
	I	II	III	
1	.082	.081	.865	.762
2	-.760	-.087	.440	.779
3	-.378	0	-.022	.144
4	.040	.372	-.267	.211
5	.138	.697	.142	.525
6	-.359	-.623	.300	.607
7	-.629	.267	-.086	.474
8	.148	-.860	-.003	.761
9	.712	-.004	-.104	.517
10	-.309	.766	-.131	.700
11	.700	.049	.590	.841
12	-.626	-.165	.010	.420
13	.699	-.058	.155	.516
14	-.611	.193	-.372	.548
15	-.191	.784	.369	.787
Total Variance	3.677	3.109	1.806	8.592
Proportion of total variance	.245	.207	.120	.573

TABLE XIII

PREDICTED FACTOR MATRIX OF QUESTIONNAIRE
ITEM RESPONSES FOR COUNSELOR GROUP

Item	Factor		
	I	II	III
1	-.561	.149	.008
2	.465	-.224	.014
3	-.011	.805	-.157
4	.689	-.011	.113
5	-.219	.689	-.211
6	.223	-.438	.158
7	-.179	.616	-.153
8	.420	-.910	.221
9	.608	.528	.062
10	-.302	.949	-.092
11	.742	-.270	.165
12	-.447	-.586	-.015
13	.520	-.679	-.007
14	-.708	.350	-.009
15	-.145	.520	-.053

TABLE XIV

COSINE OF ANGLES OF ROTATION

		Counselor		
		1	2	3
Computer	1	0.310	-.923	.230
	2	-.816	.578	-.010
	3	-.864	-.494	-.100

TABLE XV

S, POOLED COVARIANCE MATRIX FOR QUESTIONNAIRE RESPONSES (N=30)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.690	.033	-.014	-.171	.088	-.017	.014	.038	-.121	-.102	.121	-.021	-.202	-.031	.212
2		.167	.098	-.074	-.060	.083	.036	-.033	-.031	-.014	-.014	.071	-.012	.040	.052
3			1.362	.133	.138	-.186	.200	-.357	-.152	.338	-.136	-.121	-.131	.214	-.052
4				1.133	.160	-.029	-.057	-.171	-.024	-.048	.021	-.057	-.095	.050	.340
5					.952	-.512	.286	-.481	.002	.386	-.007	0.000	.083	-.105	.205
6						1.190	0.000	.517	-.157	-.374	.043	.107	-.095	-.002	-.074
7							.357	-.229	-.029	.229	-.129	.071	-.071	.079	-.029
8								1.090	-.007	-.740	.107	.057	.095	-.140	-.526
9									.919	.088	.200	-.171	-.060	-.157	.083
10										1.152	-.100	-.021	-.321	.340	.643
11											.243	-.057	.107	-.143	.029
12												.214	-.136	.079	-.100
13													.738	-.417	-.405
14														.933	.233
15															1.295

TABLE XVI

A1, MATRIX OF SUMS OF SQUARES AND CROSS PRODUCTS
OF RESPONSES TO COMPUTER QUESTIONNAIRE
(N=15)

Item	1 (A)	2 (B)	3 (C)	4 (D)	5 (E)	6 (F)	7 (G)	8 (H)	9 (I)	10 (J)	11 (K)	12 (L)	13 (M)	14 (N)	15 (O)
1	7.60	-0.20	-2.80	-0.80	-0.60	0.60	1.20	0.60	1.00	-1.00	-0.20	0.20	-6.00	3.20	2.60
2		1.73	0.93	-0.07	-0.13	1.20	-0.40	-0.20	1.33	-1.33	0.40	0.60	1.33	-1.40	-0.87
3			15.73	-0.27	7.47	-5.80	3.40	-9.80	1.33	7.67	-0.40	-1.60	-0.67	2.40	-0.47
4				3.73	-0.53	3.20	0.40	2.20	2.33	-0.33	0.60	-0.60	0.33	-0.60	1.53
5					8.93	-5.60	4.80	-7.60	-0.33	4.33	-1.80	-0.20	1.67	-2.20	-2.93
6						15.60	-0.80	7.60	-1.00	-4.00	1.80	0.20	-3.00	1.20	0.60
7							4.40	-3.80	1.00	1.00	-1.40	-0.60	-1.00	-1.60	-1.80
8								11.60	-1.00	-6.00	-2.80	1.20	2.00	-0.80	-0.40
9									15.33	3.67	2.00	-3.00	-5.67	-1.00	5.33
10										13.33	0.00	-1.00	-7.33	5.00	7.67
11											2.40	-0.40	0.00	-0.40	-0.20
12												2.40	1.00	0.40	-1.80
13													15.33	-9.00	-9.67
14														14.40	4.20
15															16.93

TABLE XVII

A2, MATRIX OF SUMS OF SQUARES AND CROSS PRODUCTS
OF RESPONSES TO COUNSELOR QUESTIONNAIRE
(N=15)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	11.73	1.13	2.40	-4.00	3.07	-1.07	-0.80	0.47	-1.60	-1.87	3.60	-0.80	0.33	-4.07	3.33
2		2.93	1.80	-2.00	-1.53	3.53	1.40	-0.73	-2.02	0.93	-0.80	1.40	-1.66	2.53	2.33
3			22.40	4.00	-3.60	0.60	2.20	-0.20	-5.60	1.80	-3.40	-1.80	-3.00	3.60	0.00
4				28.00	5.00	-4.00	-2.00	-7.00	-3.00	-1.00	0.00	-1.00	-3.00	2.00	8.00
5					17.73	-8.73	3.20	-5.87	0.40	6.47	1.60	0.20	0.67	-0.73	8.67
6						17.73	0.80	6.87	-3.40	-6.47	-0.60	2.80	0.33	-1.27	-2.67
7							5.60	-2.60	-1.80	5.40	-2.20	2.60	-1.00	3.80	1.00
8								18.93	0.80	-14.73	0.20	0.40	0.67	-3.13	-14.33
9									10.40	-1.20	3.60	-1.80	4.00	-1.87	0.93
10										18.93	-2.80	0.40	-1.67	4.53	10.33
11											4.40	-1.20	3.00	-3.60	1.00
12												3.60	-2.00	1.80	-1.00
13													5.53	-2.67	-1.67
14														11.73	2.33
15															19.33

A P P E N D I X B

PROGRAM RATING FORM

PROGRAM RATING FORM

Directions:

Examine the student's Easter marks and proposed grade X program. Circle the position of the rating scale (to the nearest half of a scale point) which represents that rating you assign this program.

STUDENT NUMBER _____

Program This Year

COURSE	MARKS
Literature	
Language	
Social Studies	
Mathematics	
Science	

Proposed Grade X Program

COURSE	NO.	CREDITS
English	10	5
Social Studies	10	5
Phys. Educ.	10	5
Mathematics		5
Science		5

COURSE _____

A few courses need to be changed.		A suitable pattern. More care should have been exercised in few of the choices.		A well thought out program.				
Some of the choices are unrealistic.				No changes are necessary.				
1	1.5	2	2.5	3	3.5	4	4.5	5

A P P E N D I X C COUNSELOR QUESTIONNAIRE

Place a check mark (✓) inside the set of parenthesis corresponding to the description which best describes the way you feel about each of the following statements.

	strongly disagree	disagree	undecided	agree	strongly agree
1. I received enough information during the interview to help me plan my high school program.	()	()	()	()	()
2. The interview was boring.	()	()	()	()	()
3. There were times I disagreed with some of the courses selected for my program.	()	()	()	()	()
4. I would have liked the counselor to tell me the choices I made were the correct ones.	()	()	()	()	()
5. Some of the topics discussed in the interview were confidential.	()	()	()	()	()
6. I could have made the same program without the help of the counselor.	()	()	()	()	()
7. I felt like the interview would never end.	()	()	()	()	()
8. I am happy with my program.	()	()	()	()	()
9. I had a lot of say in the courses selected for my program.	()	()	()	()	()
10. I think my program will have to be changed.	()	()	()	()	()
11. The instructions given by the counselor were easy to follow.	()	()	()	()	()
12. There were times I felt like stopping the interview.	()	()	()	()	()
13. It was easy to talk to the counselor.	()	()	()	()	()
14. I felt like the counselor was rushing me through the interview.	()	()	()	()	()
15. I would rather be interviewed by a machine than a human counselor.	()	()	()	()	()

A P P E N D I X D

SAMPLE COMPUTER QUESTIONNAIRE

SAMPLE COMPUTER QUESTIONNAIRE

YOU ARE GOING TO BE PRESENTED WITH 15 STATEMENTS ABOUT THE INTERVIEW YOU HAVE JUST COMPLETED. EACH STATEMENT WILL BE FOLLOWED BY THE FOLLOWING FIVE DESCRIPTIONS:

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

DECIDE WHICH OF THE FIVE DESCRIPTIONS BEST DESCRIBES THE WAY YOU FEEL ABOUT THE STATEMENT. TYPE YOUR ANSWER (FROM 1 TO 5) BELOW THE SET OF STARS.

A) I RECEIVED ENOUGH INFORMATION DURING THE INTERVIEW TO HELP ME PLAN MY HIGH SCHOOL PROGRAM.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

4

B) THE INTERVIEW WAS BORING.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

1

C) THERE WERE TIMES I DISAGREED WITH SOME OF THE COURSES SELECTED FOR MY PROGRAM.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

2

D) I WOULD HAVE LIKED THE COMPUTER TO TELL ME THAT THE CHOICES I MADE WERE THE CORRECT ONES.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

5

E) SOME OF THE TOPICS DISCUSSED IN THE INTERVIEW WERE CONFIDENTIAL.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

2

F) I COULD HAVE MADE THE SAME PROGRAM WITHOUT THE HELP OF THE COMPUTER.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

4

G) IT FELT LIKE THE INTERVIEW WOULD NEVER END.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

1

H) I AM HAPPY WITH MY PROGRAM.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

5

I) I HAD A LOT OF SAY IN THE COURSES SELECTED FOR MY PROGRAM.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

4

J) I THINK MY PROGRAM WILL HAVE TO BE CHANGED.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

2

K) THE INSTRUCTIONS GIVEN BY THE COMPUTER WERE EASY TO FOLLOW.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

5

L) THERE WERE TIMES I FELT LIKE STOPPING THE INTERVIEW.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

2

M) IT WAS EASY TO TALK TO THE COMPUTER.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

5

N) IT FELT LIKE THE COMPUTER WAS RUSHING ME THROUGH THE INTERVIEW.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

4

O) I WOULD RATHER BE INTERVIEWED BY A HUMAN COUNSELOR.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

1

HERE IS A REVIEW OF THE STATEMENTS WITH THE DESCRIPTIONS YOU HAVE CHOSEN.

A) I RECEIVED ENOUGH INFORMATION DURING THE INTERVIEW TO HELP ME PLAN MY HIGH SCHOOL PROGRAM.

4 . AGREE

B) THE INTERVIEW WAS BORING.

1 . STRONGLY DISAGREE

C) THERE WERE TIMES I DISAGREED WITH SOME OF THE COURSES SELECTED FOR MY PROGRAM.

2 . DISAGREE

D) I WOULD HAVE LIKED THE COMPUTER TO TELL ME THAT THE CHOICES I MADE WERE THE CORRECT ONES.

5 . STRONGLY AGREE

E) SOME OF THE TOPICS DISCUSSED IN THE INTERVIEW WERE CONFIDENTIAL.

2 . DISAGREE

F) I COULD HAVE MADE THE SAME PROGRAM WITHOUT THE HELP OF THE COMPUTER.

4 . AGREE

G) IT FELT LIKE THE INTERVIEW WOULD NEVER END.

1 . STRONGLY DISAGREE

H) I AM HAPPY WITH MY PROGRAM.

5. STRONGLY AGREE

I) I HAD A LOT OF SAY IN THE COURSES SELECTED FOR MY PROGRAM.

4. AGREE

J) I THINK MY PROGRAM WILL HAVE TO BE CHANGED.

2. DISAGREE

K) THE INSTRUCTIONS GIVEN BY THE COMPUTER WERE EASY TO FOLLOW.

5. STRONGLY AGREE

L) THERE WERE TIMES I FELT LIKE STOPPING THE INTERVIEW.

2. DISAGREE

M) IT WAS EASY TO TALK TO THE COMPUTER.

5. STRONGLY AGREE

N) IT FELT LIKE THE COMPUTER WAS RUSHING ME THROUGH THE INTERVIEW.

4. AGREE

O) I WOULD RATHER BE INTERVIEWED BY A HUMAN COUNSELOR.

1. STRONGLY DISAGREE

READ THE LIST CAREFULLY (TAKE YOUR TIME). IF YOU THINK 87
THE LIST IS CORRECT, TYPE Y. IF YOU WOULD LIKE TO CHANGE
SOME OF THE ANSWERS TYPE N.

2

TYPE Y OR N , YOU HAVE TYPED 2.

N

HOW MANY ANSWERS WOULD YOU LIKE CHANGED?

2

YOU WANT 2 ANSWERS CHANGED?

Y

TYPE THE LETTER FOR:

CHANGE 1

I

CHANGE 2

N

I) I HAD A LOT OF SAY IN THE COURSES SELECTED FOR MY
PROGRAM.

1. STRONGLY DISAGREE
2. AGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

1

N) IT FELT LIKE THE COMPUTER WAS RUSHING ME THROUGH THE INTERVIEW.

1. STRONGLY DISAGREE
2. DISAGREE
3. UNDECIDED
4. AGREE
5. STRONGLY AGREE

3

HERE IS A LIST OF THE STATEMENTS WITH THE DESCRIPTIONS WHICH YOU HAVE CHANGED.

I) I HAD A LOT OF SAY IN THE COURSES SELECTED FOR MY PROGRAM.

1. STRONGLY DISAGREE

N) IT FELT LIKE THE COMPUTER WAS RUSHING ME THROUGH THE INTERVIEW.

3. UNDECIDED

READ THE LIST CAREFULLY (TAKE YOUR TIME). IF YOU THINK THE LIST IS CORRECT, TYPE Y. IF YOU WOULD LIKE TO CHANGE SOME OF THE ANSWERS TYPE N.

Y

THANK YOU. THAT IS ALL.

4 1 2 5 2 4 1 5 1 2 5 2 5 3 1

A P P E N D I X E

APL PROGRAMS USED IN COMPUTER INTERVIEW

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▽ INTERVIEW
[1] T1←(I20)÷6
[2] '
HELLO.

YOU ARE ABOUT TO PARTICIPATE IN AN INTERVIEW WITH A
COMPUTERIZED COUNSELOR. THE COMPUTER WILL HELP YOU
PLAN YOUR GRADE 10 HIGH SCHOOL PROGRAM AS WELL AS
DISCUSS WHAT YOU WANT TO DO IN HIGH SCHOOL AND
LATER LIFE.

BUT FIRST, JUST TO LET THE COMPUTER KNOW YOU ARE
THERE PLEASE TYPE THE LETTER Y AND THEN PRESS THE
CARRIAGE RETURN KEY (THE LARGE RECTANGULAR KEY
ON THE RIGHT HAND SIDE OF THE KEYBOARD).'

[3] C←0
[4] ANS←'Y'
[5] BEG1:C←C+1
[6] BEG2:S←C CHECK ANS
[7] →((S=1),(S=0),(S=3),(S=4))/S2,S1,BEG3,M1
[8] →(C=15)/ON1,ON2,ON3,ON4,ON6
[9] ''
[10] S2:'PLEASE CHECK WITH MR. ROMANIUK.'
[11] S1:→0
[12] ON1:'EXCELLENT.'

NOW, THE MOST IMPORTANT KEY IS THE RETURN KEY. WHEN
YOU PRESS THE RETURN KEY, THIS LETS THE COMPUTER
KNOW THAT YOU HAVE COMPLETED YOUR ANSWER.

JUST FOR PRACTICE TYPE THE LETTER N AND THEN PRESS
THE RETURN.'

[13] ANS←'N'
[14] →BEG1
[15] ON2:'O.K.'

SOMETIMES YOU WILL BE ASKED TO ANSWER A QUESTION.
IF YOU AGREE, TYPE THE LETTER Y TO MEAN YES. IF
YOU DISAGREE, TYPE THE LETTER N TO MEAN NO. (DO
NOT FORGET THE RETURN KEY)

WELL LET US TRY IT. HERE IS A QUESTION.

ARE YOU TAKING THIS INTERVIEW AT THE UNIVERSITY OF
ALBERTA?
,

[16] ANS←'Y'
[17] →BEG1
[18] ON3:'CORRECT.'

[19] M1: '
BY NOW YOU HAVE NOTICED THAT BEFORE YOU TYPE AN
ANSWER, THE TYPEWRITER TYPES STARS LIKE THIS:

THIS IS TO LET YOU KNOW THAT IT IS TIME FOR YOU TO
TYPE SOMETHING. DO NOT TYPE ANYTHING UNTIL THE
COMPUTER HAS TYPED THE STARS.

[20] →(C=4)/M2
[21] 'DO YOU UNDERSTAND? (TYPE Y OR N)'
[22] →BEG1
[23] ON4:→(S=2)/M1
[24] '
GOOD.

[25] M2: 'AT TIMES DURING THIS INTERVIEW, YOU WILL BE PRE-
SENTED WITH QUESTIONS TO WHICH THERE ARE NO RIGHT OR
WRONG ANSWERS. THE QUESTIONS WILL CONTAIN A NUMBER
OF CHOICES.

YOU WILL BE ASKED TO SELECT THE CHOICE(S) YOU THINK
ARE BEST.

I WILL NOW LET YOU ANSWER SUCH A QUESTION.'
[26] BEG3: '

HERE IS A LIST OF SPORTING ACTIVITIES:

CODE SPORT

1	HOCKEY
2	SKATING
3	CURLING
4	BASEBALL
5	SOFTBALL
6	FOOTBALL
7	BOWLING
8	TENNIS

IN HOW MANY OF THE ABOVE ACTIVITIES DO YOU PARTICIPATE?
TYPE ONLY ONE NUMBER (FROM 1 TO 8). IF YOU DO NOT PART-
ICIPATE IN ANY ACTIVITIES, TYPE THE NUMBER 0.'

[27] S3:ANS1←'HOCKEY SKATING CURLING BASEBALL'
[28] ANS1←ANS1,'SOFTBALLFOOTBALLBOWLING TENNIS '
[29] T←INP1 8 0
[30] ''
[31] J←p,T
[32] →((J=1),(K=0))/BEG4,BEG5
[33] '

THE SPORTS YOU PARTICIPATE IN ARE: '


```

[34] MA←(((ρ,T),8)ρ(18))+8×Q((8,(ρ,T))ρ(T-1))
[35] ''
[36] O1:KK←0
[37] O2:KK←KK+1
[38] ANS1[(,MA[KK;])]
[39] →(KK<ρ,T)/O2
[40] ''
[41] →BEG6
[42] BEG4:L←ANS1[((T-1)×8)+18]
[43] ('THE ONE SPORT YOU PARTICIPATE IN IS ';L;'.')
[44] ''
[45] →BEG6
[46] BEG5:'YOU DO NOT PARTICIPATE IN ANY SPORTING ACTIVITIES.
[47] BEG6:→(C=5)/ON6
[48] 'IF THE ABOVE ANSWER IS CORRECT TYPE Y . IF YOU
DISAGREE WITH THE ANSWER TYPE N AND I WILL LET YOU
TRY IT AGAIN.'
[49] →(C=4)/BEG1
[50] ON6:T2←(120)÷6
[51] '
NOW THAT YOU KNOW HOW TO OPERATE THE TERMINAL, WE
ARE READY TO CARRY ON WITH THE INTERVIEW.'
[52] ON9:'
PLEASE TYPE YOUR CODE NUMBER.'
[53] CF←C←CODE
[54] →(C=1)/O
[55] M←NAME C
[56] ('ARE YOU ';M;'?')
[57] '
TYPE Y OR N .'
[58] S←7 CHECK 'Y'
[59] →(S=1)/ON7
[60] ''
[61] ('SINCE YOUR NAME IS NOT ';M;' WOULD YOU')
[62] 'PLEASE CALL MR. ROMANIUK AND HE WILL CHECK YOUR
CODE NUMBER.'
[63] OH←☐
[64] →(OH='Y')/ON9
[65] '
YOU HAVE NOT FOLLOWED INSTRUCTIONS. PLEASE CALL
MR. ROMANIUK AND HE WILL CHECK YOUR CODE NUMBER,
OTHERWISE THIS INTERVIEW WILL BE TERMINATED.'
[66] OH←☐
[67] →((OH='Y'),(OH≠'Y'))/ON9,0
[68] ON7:'
ACCORDING TO MY RECORDS, THESE WERE YOUR EASTER
REPORT CARD MARKS.'
[69] SUB AM←EAS C
[70] AN←AMD C
[71] AN EX AO←OTH C
[72] '

```

AFTER YOU FINISH HIGH SCHOOL, DO YOU PLAN TO
CONTINUE YOUR FORMAL EDUCATION?'


```

[73] S←8 CHECK 'Y'
[74] →((S=0),(S=̄1))/P4,S2
[75] '

    FROM THE FOLLOWING LIST, SELECT THE ONE TYPE OF
    SCHOOL YOU PLAN TO ATTEND.

    1  NAIT OR SAIT
    2  NURSING SCHOOL
    3  UNIVERSITY
    4  I HAVE NOT DECIDED YET
    5  NONE OF THE CHOICES APPLY TO ME

    TYPE THE NUMBER OF YOUR CHOICE.'
[76] T←INP1 5 0
[77] ''
[78] →(T>3)/P4
[79] H←CHOICE T
[80] ('WOULD YOU LIKE SOME INFORMATION ABOUT ';H)
[81] S←9 CHECK 'Y'
[82] ''
[83] →((S=0),(S=̄1))/P,S2
[84] →(T=12)/P2,P3
[85] UNI
[86] →P
[87] P2:NA
[88] →P
[89] P3:NU
[90] →P
[91] P4:'
    WOULD YOU LIKE SOME INFORMATION ABOUT APPRENTICE-
    SHIP TRAINING?'
[92] T←6
[93] S←9 CHECK 'Y'
[94] →((S=0),(S=̄1))/P5,S2
[95] AT
[96] P5:'
    '
[97] →(T<6)/P
[98] 'THE TYPE OF JOB YOU GET OR THE TYPE OF TRAINING YOU
    WILL BE ABLE TO RECEIVE WILL BE GREATLY DETERMINED
    BY THE MARKS YOU WILL RECEIVE IN HIGH SCHOOL.'
[99] →P6
[100] P:'

```

THE TYPE OF SCHOOL YOU WILL BE ABLE TO ATTEND AFTER
HIGH SCHOOL WILL BE GREATLY DETERMINED BY THE MARKS
YOU WILL RECEIVE IN HIGH SCHOOL.'

[101] P6:'

LET US ASSUME THAT YOUR GRADE NINE DEPARTMENTAL MARKS WILL BE THE SAME AS YOUR PRESENT EASTER REPORT CARD MARKS.

IF SO, THEN HERE IS A LOOK AT HOW STUDENTS WITH MARKS LIKE YOURS DID IN HIGH SCHOOL.

[102] PE←MARKS AM

[103] ''

[104] G←' PER CENT COMPLETED '

[105] (PE[1];G;'GRADE 10 (30 CREDITS OR MORE)')

[106] (PE[2];G;'GRADE 11 (65 CREDITS OR MORE)')

[107] (PE[3];G;'100 CREDITS (OR MORE)')

[108] (PE[4];' PRE CENT RECEIVED A HIGH SCHOOL DIPLOMA')

[109] (PE[5];' PER CENT OBTAINED MATRICULATION')

[110] '

NOW LET US DISCUSS A TENTATIVE GRADE 10 COURSE PLAN. HERE IS A LIST OF THE THREE HIGH SCHOOL PROGRAMS OFFERED AT ST. FRANCIS XAVIER.

1. BUSINESS(DIPLOMA)

2. GENERAL(DIPLOMA)

3. MATRICULATION

,

[111] P7:'PLEASE SELECT THE PROGRAM YOU WOULD LIKE TO TAKE NEXT YEAR.'

[112] TT←INP1 3 0

[113] ''

[114] Y←HIGH TT

[115] ('YOUR CHOICE IS THE ';Y;' PATTERN?')

[116] '(Y OR N)'

[117] S←9 CHECK 'Y'

[118] →((S=0),(S=1))/P7,S2

[119] '

THE FOLLOWING ARE REQUIRED COURSES (EACH COURSE HAS A VALUE OF 5 CREDITS)

,

[120] REQ TT,0

[121] '

TOTAL CREDITS = 2 5

IT IS GENERALLY RECOMMENDED THAT GRADE 10 STUDENTS CARRY A COURSE LOAD OF AT LEAST 35 CREDITS,BUT NO MORE THAN 40 CREDITS.'

[122] Z3:''

[123] 'HERE IS A LIST OF THE OPTIONS YOU MAY CHOOSE FROM. REMEMBER THAT EACH COURSE IS ASSIGNED 5 CREDITS.

,

[124] OP\7


```

[125] ''
[126] →(TT≠3)/Z1
[127] 'SINCE YOU ARE IN THE MATRIC. PATTERN, IT WOULD BE
      ADVISEABLE TO CHOOSE FRENCH OR LATIN AS ONE OF
      YOUR OPTIONS.
      '
[128] Z1:'
      BEFORE YOU ACTUALLY CHOOSE YOUR OPTIONS, WOULD YOU
      LIKE ANY INFORMATION ABOUT ANY OF THE OPTIONS?'
[129] S←9 CHECK 'Y'
[130] →(S=0)/Z4
[131] '
      HOW MANY OF THE OPTIONS WOULD YOU LIKE INFORMATION
      ABOUT?'
[132] T←INP1 7 1
[133] INFO T,T
[134] Z4:'
      IT IS RECOMMENDED THAT STUDENTS TAKE ONLY 2 OPTIONS.
      A MAXIMUM OF 3 OPTIONS IS PERMISSABLE IF YOU HAVE A
      HIGH GRADE 9 AVERAGE.

      HOW MANY OPTIONS WOULD YOU LIKE TO TAKE (2 OR 3)?'
[135] T←INP1 7 0
[136] →(2=+/(5 6)∈T)/Z9
[137] →((~CF∈ 1 2 4 5 6 9 11 13 15)∨(~4∈T))/Z8
[138] '
      BOYS ARE NOT ADMITTED INTO FAB-AND-DRESS.'
[139] →Z7
[140] Z9:'
      STUDENTS ARE REQUESTED TO TAKE ONLY ONE
      LANGUAGE AS AN OPTION.
      '
[141] →Z7
[142] Z8:'
      THEREFORE YOUR OPTIONS ARE:
      '
[143] OP T
[144] ''
[145] 'IS THIS CORRECT?'
[146] S←9 CHECK 'Y'
[147] →((S=1),(S=̄1))/Z2,S2
[148] Z7:'LET US TRY SELECTING THE OPTIONS AGAIN.'
[149] →Z3
[150] Z2:' THIS IS WHAT YOUR PROPOSED PROGRAM LOOKS LIKE:
      '
[151] REQ TT,1
[152] OP T
[153] ''
[154] FN←(1 1)GEN M,' '
[155] (FN;',' WHEN THIS INTERVIEW IS COMPLETED, MR.')
```


[156] 'ROMANIUK WILL GIVE YOU A PLANNING BOOKLET TO BE USED BY STUDENTS WHO WILL BE ATTENDING ST. FRANCIS XAVIER HIGH SCHOOL. ALSO, YOU WILL BE GIVEN THE PAPER ON WHICH THIS INTERVIEW IS NOW BEING TYPED.

PLEASE DISCUSS THE PROPOSED PROGRAM WITH YOUR PARENTS OR GUARDIANS. AFTER YOU HAVE DECIDED ON YOUR FINAL PROGRAM FILL IN THE PROGRAM FORM YOU WILL FIND IN THE BOOKLET.

HAND THE COMPLETED FORMS TO MR. OSTASHEWSKI BY MONDAY.

I HOPE THAT THIS INTERVIEW HAS BEEN AN AID IN HELPING YOU PLAN YOUR GRADE 10 PROGRAM.

[157] ('THANKS ';FN;', ITS BEEN NICE TALKING TO YOU.')

[158] $T3 \leftarrow (T20) \div 6$

[159] $T1 \leftarrow (\lfloor (T2 - T1) \div 60 \rfloor \div 10)$

[160] $T2 \leftarrow (\lfloor (T3 - T2) \div 60 \rfloor \div 10)$

[161] '

[162] $MI \leftarrow$ ' MINUTES '

[163] 'TIME FOR:

1 LEARNING OPER. '

[164] (' OF TERMINAL = ';T1;MI)

[165] ('2 INTERVIEW = ';T2;MI)

[166] ('3 TOTAL SESSION= ';T1+T2;MI)

[167] '

THIS INTERVIEW IS NOW COMPLETE. BEFORE YOU GO, I WOULD LIKE YOU TO ANSWER A QUESTIONNAIRE CONCERNING THIS INTERVIEW.

PLEASE CALL MR. ROMANIUK AND HE WILL INSTRUCT ME TO GIVE YOU THE QUESTIONNAIRE.'

SUBPROGRAMS

```

▽ AN←AMD C
[1] AN1←'ART-----MUSIC-----DRAMA-----COMM.EC.---'
[2] AN1←AN1,'FRENCH-----CHORAL-----'
[3] →(C=3+112)/ 6 8 8 10 10 ,(4p12),3p14
[4] AN←AN1[110],AN1[40+110]
[5] →0
[6] AN←AN1[110],AN1[20+110]
[7] →0
[8] AN←AN1[120]
[9] →0
[10] AN←AN1[110],AN1[50+110]
[11] →0
[12] AN←AN1[20+120]
[13] →0
[14] AN←AN1[20+110],AN1[40+110]

```

▽

▽ AT

- [1] A1←' THE MINIMUM AGE REQUIREMENT FOR APPRENTICESHIP TRAINING IS 16 YEARS. THE APPRENTICE(PERSON LEARNING THE TRADE) WORKS UNDER THE SUPERVISION OF A JOURNEY-MAN IN THAT PARTICULAR TRADE, TAKES SHORT COURSES AT NAIT, AND IS PAID WHILE HE TAKES HIS TRAINING.

WOULD YOU LIKE SOME INFORMATION ABOUT DIFFERENT APPRENTICE TRADES AND THE MINIMUM EDUCATIONAL REQUIREMENTS NEEDED FOR ENTRY?'

- [2] A2←'GASFITTER, WELDER, LATHER, COOK, BAKER, ROOFER.
'

- [3] A3←'BRICKLAYER, CARPENTER, PAINTER AND DECORATOR, PLASTERER, MOTOR MECHANIC, AUTO BODY MECHANIC, REFRIGERATION MECHANIC, HEAVY DUTY MECHANIC, AND TILESTTER.
'

- [4] A4←'PARTSMAN
'

- [5] A5←'CONSTRUCTION ELECTRICIAN, PLUMBER, STEAMFITTER, RADIO TECHNICIAN, MACHINIST, POWER ELECTRICIAN, COMMUNICATIONS GLASSWORKER , AND IRONWORKER.'

- [6] A1

- [7] S←8 CHECK 'Y'

- [8] →(S=0)/0

- [9] C←'MINIMUM EDUCATION---GRADE '

- [10] B←'YEARS OF APPRENTICESHIP---'

- [11] (C;'9')

- [12] (B;'3')

- [13] A2

- [14] (C;'9')

- [15] (B;'4')

- [16] A3

- [17] (C;'10')

- [18] (B;'3')

- [19] A4

- [20] (C;'10')

- [21] (B;'4')

- [22] A5

▽


```

      ▽ S←COUN CHECK ANS
[1]   CR←0
[2]   CR←CR+1.
[3]   ''
[4]   '****'
[5]   IN←☐
[6]   R←ANS CHEK1 IN
[7]   ''
[8]   CN←COUN
[9]   U1←(R=1),(R=1),((CN>2)^(R=0))
[10]  →U1/ 23 29 37
[11]  →((CR<3),(CR=3))/ 16 19
[12]  ('YOU HAVE HAD FOUR TRIES AT TYPING ';ANS;' .CHECK')
[13]  'WITH MR. ROMANIUK TO FIND THE DIFFICULTY.'
[14]  S←0
[15]  →0
[16]  ('YOU HAVE NOT TYPED ';ANS;' . CHECK THE KEYBOARD,')
[17]  ('TYPE ';ANS;' AND DO NOT FORGET THE RETURN KEY.')

```

▽


```

      ▽ R←ANS CHEK1 IN
[1]   J←p,ANS
[2]   I←p,IN
[3]   →((I>J)∨(I<J))/7
[4]   →(ANS≠IN)/7
[5]   R←1
[6]   →0
[7]   →(I≠4)/11.
[8]   →(IN≠'STOP')/11
[9]   R←-1
[10]  →0
[11]  R←0
[12]  →0

```

▽

```

      ▽ G←CHOICE T
[1]   CH←'NAIT OR SAIT?NURSING?UNIVERSITY?'
[2]   G←(1,T)GEN CH,'?'

```

▽

```

      ▽ AM←EAS C
[1]   A1← 45 45 35 30 40 50 45 50 35 50 60 40 40 35 40
      30 30 20 35 25 55 50 50 50 65
[2]   A1←A1, 60 50 50 55 60 55 45 65 45 55 70 55 60 60
      60 45 40 40 65 60 60 55 45 50 45
[3]   A1←A1, 40 40 40 20 40 40 35 35 40 40 55 40 30 35
      60 65 50 45 65 50 60 50 45 50 45
[4]   AM←A1[(15)+5×C-1]

```

▽

```

      ▽ W←AN EX AO
[1]   (AN[10];AO[12])
[2]   (AN[10+10];AO[2+12])

```

▽

▽ $G \leftarrow B \text{ GEN } L$

[1] $VU \leftarrow 0, ((L[H1]) \in L[\rho L]) / H1 \leftarrow \imath(\rho L) - 1$
 [2] $G \leftarrow (((\rho G) - 1) \rho 1), B[1] = 1) / G \leftarrow L[DE + \imath VU[B[2] + 1] - DE + VU[B[2]]]$

▽

▽ $Y \leftarrow \text{HIGH } Q$

[1] $CR \leftarrow '$
 ,
 [2] $Q1 \leftarrow 'BUSINESS(DIPLOMA)$
 $GENERAL(DIPLOMA)$
 $MATRICULATION$
 ,
 [3] $Y \leftarrow (0, Q) \text{ GEN } Q1, CR$

▽

▽ $\text{INFO } T$

[1] $K \leftarrow 0$
 [2] $K \leftarrow K + 1$
 [3] , ,
 [4] $\rightarrow ((2 \times K) > \rho, T) / 0$
 [5] $\rightarrow (T[K] = \imath 7) / 4 + 2 \times \imath 7$
 [6] '1. ART 10: IN THIS COURSE ONE STUDIES DESIGN, COLOR AND COMPOSITION, OUTDOOR SKETCHING, STILL LIFE AND FIGURE DRAWING.'
 [7] $\rightarrow 2$
 [8] '2. BOOKKEEPING 10: PROVIDES BASIC TRAINING IN BOOKKEEPING AND A MORE ADVANCED TRAINING IN ACCOUNTANCY.'
 [9] $\rightarrow 2$
 [10] '3. DRAMA 10: IS A PREREQUISITE FOR DRAMA 20 AND 30 OR IT MAY SERVE AS A TERMINAL COURSE. IT INTRODUCES ALL THE ACTIVITIES INVOLVED IN PRODUCTION.'
 [11] $\rightarrow 2$
 [12] '4. FAB AND DRESS 10: DESIGNED TO HELP STUDENTS DEVELOP GOOD JUDGMENT IN SELECTION OF STYLE AND FABRIC AND TO LEARN TO CONSTRUCT GARMENTS OF VARYING DIFFICULTY.'
 [13] $\rightarrow 2$
 [14] '5. FRENCH 10: THE OBJECTIVE OF THIS COURSE IS TO UNDERSTAND, TO SPEAK, AND TO WRITE FRENCH AS WELL AS POSSIBLE. THIS COURSE IS A PREREQUISITE FOR FRENCH 20 AND 30.'
 [15] $\rightarrow 2$
 [16] '6. LATIN 10: THIS IS AN INTRODUCTORY COURSE IN LATIN. IT IS A PREREQUISITE FOR LATIN 20 AND LATIN 30.'
 [17] $\rightarrow 2$
 [18] '7. TYPEWRITING 10: AN INTRODUCTORY COURSE. THIS COURSE IS A PREREQUISITE FOR TYPEWRITING 20 AND 30.'
 [19] $\rightarrow 2$

▽


```

    ▽ T←INP1 NO
[1]  II←0
[2]  ZA←'FIRST SECOND THIRD FOURTH FIFTH SIXTH SEVENTH'
[3]  ZA←ZA,'EIGHTH '
[4]  K←0
[5]  I←10
[6]  NO←(N←NO[1]),A←NO[2]
[7]  →(K=0)/10
[8]  '
[9]  (ZA[(7×K-1)+17];' CHOICE?')
[10] '****'
[11] IN←□
[12] →((ρ,IN)>1)/17
[13] →(K≥1)/16
[14] →((N=5),(N=3),(N=2))/3ρ16
[15] →(1=×/(IN∈'0'),1)/47
[16] →(1=×/(IN∈'12345678'),1)/21
[17] ''
[18] ('YOUR ANSWER MUST CONTAIN ONE NUMERAL FROM 1 TO ';N)
[19] '
    TRY AGAIN.'
[20] →7
[21] INN←('12345678')\IN
[22] →((ρ,INN)≠1)/17
[23] B←((INN>5)^(N=5)),((INN>3)^(N=3)),((INN>2)^(N=2))
[24] B←B,((INN>3)^(N=7)^(K=0)^(A=0)),((INN>7)^(N=7)^(K>0))
[25] B←B,((INN<2)^(N=7)^(K=0)^(A=0)),((INN<1)^(N=2)^(K=0))
[26] →(B)/ 17 17 17 53 17 51 17
[27] →((N=5),(N=3),(N=2))/3ρ49
[28] →(K>0)/37
[29] ''
[30] →(INN≠1)/34
[31] 'TYPE THE NUMBER CORRESPONDING TO YOUR CHOICE.'
[32] →35
[33] ''
[34] 'TYPE THE CODE NUMBER CORRESPONDING TO YOUR:'
[35] II←INN
[36] →42
[37] →(K≤1)/41
[38] →(×/(I≠INN),1)/41
[39] ('YOU HAVE ALREADY TYPED ';INN)
[40] →7
[41] I←I,INN
[42] K←K+1
[43] →((II=1)^(K=1))/10
[44] →(K≤II)/7

```


[45] $T \leftarrow I$
[46] $\rightarrow 0$
[47] $T \leftarrow 10$
[48] $\rightarrow 0$
[49] $T \leftarrow INN$
[50] $\rightarrow 0$
[51] 'YOU ARE REQUESTED TO TAKE AT LEAST 2 OPTIONS.
TRY AGAIN.'
[52] $\rightarrow 10$
[53] 'YOU MAY SELECT ONLY A MAXIMUM OF 3 OPTIONS.
TRY AGAIN.'
[54] $\rightarrow 10$

▽ PE←MARKS AM

```
[1] AV←(+/AM[15])÷5
[2] →((AV<40),(AV>79))/ 12 6
[3] →((AV<50),(AV>64))/ 10 8
[4] PE← 90 63 30 26 3
[5] →0
[6] PE← 97 92 84 84 70
[7] →0
[8] PE← 95 80 60 56 2 5
[9] →0
[10] PE← 65 37 10 8 0
[11] →0
[12] PE← 25 9 0 0 0
```

▽

▽ MATH

[1] M3←'

MATH 10- THE PREREQUISITE FOR THIS COURSE IS AT LEAST
B (50 PER CENT OR MORE) IN GRADE 9 MATH. THIS
MATH IS USUALLY TAKEN BY STUDENTS WISHING TO
GO TO UNIVERSITY OR TECHNICAL SCHOOL.

MATH 11- DESIGNED FOR STUDENTS ENTERING BUSINESS OR
CONSUMER OCCUPATIONS.

MATH 12- IS A FIRST MATH COURSE IN THE VOCATIOAL PATTERN.

,

[2] M3

▽

▽ NA

[1]

MOST OF THE TECHNOLOGY PROGRAMS AT NAIT REQUIRE AT LEAST TWO YEARS TO COMPLETE. FOR THE MAJORITY OF THE TECHNOLOGIES, THE ENTRANCE REQUIREMENT IS A HIGH SCHOOL DIPLOMA WITH AT LEAST B STANDING IN GRADE 12 MATHEMATICS.

ONE OF THE EXCEPTIONS TO THE ABOVE REQUIREMENT IS THE MEDICAL SCIENCE PROGRAM (LAB.TECH., RECORD LIBRARIAN, OR X-RAY TECH.). THE ENTRANCE REQUIREMENT TO THIS PROGRAM IS A TOTAL OF FIVE GRADE 12 MATRIC. SUBJECTS WITH AN OVERALL AVERAGE OF AT LEAST 60 PER CENT AND NO SUBJECT LESS THAN 50 PER CENT.'

▽

▽ M←NAME C

[1]

CR←'

,

[2]

AA←'ARTHUR SMITH

ANN SMITH

BILL SMITH

BONNIE SMITH

COLLEEN SMITH

CARL SMITH

DONNA SMITH

DARRYL SMITH

EDNA SMITH

EDWARD SMITH

FRED SMITH

JANE SMITH

JAMES SMITH

LORETTA SMITH

LEONARD SMITH

,

[3]

M←(0,C)GEN AA,CR

▽

▽ NU

- [1] U2+' STUDENTS CONSIDERING A CAREER IN NURSING ARE ENCOURAGED TO COMPLETE THE REQUIREMENTS FOR MATRICULATION.

IN ORDER TO MEET THE CHALLENGE THAT NURSING PRESENTS, MANY REGISTERED NURSES COMPLETE SPECIAL PREPARATION AT UNIVERSITY. NURSING DUTIES RANGE FROM BEDSIDE NURSING THROUGH TEACHING AND RESEARCH TO ADMINISTRATION AND PUBLIC HEALTH.

APPLICANTS WHO COMPLETE SENIOR MATRICULATION AND WHO POSSESS THE PERSONAL QUALITIES SO NECESSARY FOR NURSING ARE GIVEN PREFERENCE IN THE ALBERTA SCHOOLS OF NURSING.'

- [2] U2

▽

▽ OP T

- [1] MC+'ART BOOKKEEPING DRAMA FAB-AND-DRESS FRENCH '
 [2] MC+MC,'LATIN TYPEWRITING '
 [3] J8+p,T
 [4] J9+0
 [5] J9+J9+1
 [6] ((J8>3)/J9;(2p(J8>3))/' ';(1,T[J9])GEN MC,' ' ;'10')
 [7] →((J9<J8),(J9≥J8)^(J8>3))/ 5 0
 [8] ''
 [9] ('TOTAL CREDITS = ' ;25+5×J8)

▽

▽ AO+OTH C

- [1] A2+'60B 75B+65A 50D 80A 85A 80H 80B B⁻45B 40B 35
 B+50B⁻B B H B B+'
 [2] AO+A2[(14)+4×C-1]

▽

▽ REQ T

```

[1] MC←'ENGLISH SOC.ST. PHY.ED. MATH SCIENCE '
[2] MD←'1012'
[3] J1←0
[4] J3←0
[5] J1←J1+1
[6] J2←0
[7] J2←J2+1
[8] J3←J3+1
[9] →(J3>ρ,MC)/0
[10] →(MC[J3]≠' ')/7
[11] →(((T[1]=1)^(J1>3)),(T[1]=2)^(J1>3))/ 14 16
[12] (MC[(J3-J2)+1J2];MD[2 ])
[13] →5
[14] (MC[(J3-J2)+1J2];MD[1 3])
[15] →5
[16] →(T[2]=1)/44
[17] C←MC[(J3-J2)+1J2]
[18] ''
[19] ('YOU ARE REQUIRED TO TAKE A ';C;'COURSE. HERE IS')
[20] ('A LIST OF THE GRADE 10 ';C;'COURSES OFFERED AT')
[21] 'ST. FRANCIS.
    ,
[22] J6←0
[23] J6←J6+1
[24] (J6;' ';C;MD[1,1+J6])
[25] →(((J6<3)^(J1=4)),(J6<2)^(J1=5))/23
[26] '
    ,
[27] ('WOULD YOU LIKE INFORMATION ABOUT THE ';C;'COURSES?')
[28] S←9 CHECK 'Y'
[29] →(S=0)/34
[30] →(J1=5)/33
[31] MATH
[32] →35
[33] SCI
[34] ''
[35] ('TYPE THE CODE OF THE ';C;'OPTION OF YOUR CHOICE.')
[36] →(J1=5)/47
[37] J6←J5←INP1 3 0
[38] ''
[39] ('YOU HAVE CHOSEN ';C;MD[1,1+J6];' ?')
[40] S←9 CHECK 'Y'
[41] →(S=0)/35
[42] →(J1=5)/0
[43] →5
[44] ('MATH ';MD[1,1+J5])
[45] ('SCIENCE ';MD[1,1+J6])
[46] →0
[47] J6←INP1 2 0
[48] →38

```

▽

▽ SCI
 [1] M4+
 SCIENCE 10- THE PREREQUISITE FOR THIS COURSE IS AT LEAST B OR BETTER IN GRADE 9 SCIENCE. THIS COURSE CONSISTS OF A HALF YEAR OF CHEMISTRY AND A HALF YEAR OF PHYSICS.

SCIENCE 11- THIS IS A GENERAL COURSE INQUIRING INTO GEOLOGY, WEATHER, CHEMISTRY, PHYSICS, ASTRONOMY, AND BIOLOGY.

[2] M4

▽

▽ V+SUB AM
 [1] '
 SUBJECT MARK
 '
 [2] ('LITERAT.--';AM[1])
 [3] ('LANGUAGE--';AM[2])
 [4] ('SOC.ST.---';AM[3])
 [5] ('MATH.-----';AM[4])
 [6] ('SCIENCE---';AM[5])

▽

▽ UNI
 [1] U3+ ' STUDENTS CONSIDERING ATTENDANCE AT UNIVERSITY ARE ENCOURAGED TO COMPLETE REQUIREMENTS FOR MATRICULATION

TO ENTER UNIVERSITY, STUDENTS MUST POSSESS A HIGH SCHOOL DIPLOMA AND HAVE AT LEAST B STANDING IN 4 OR 5 OF THE GRADE 12 MATRICULATION SUBJECTS. THE AVERAGE IN THESE SUBJECTS SHOULD BE AT LEAST 60 PER CENT. '

[2] U3

▽

A P P E N D I X F

APL PROGRAMS USED IN COMPUTER QUESTIONNAIRE

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∇ QUE
[1] '

YOU ARE GOING TO BE PRESENTED WITH 15 STATEMENTS ABOUT
THE INTERVIEW YOU HAVE JUST COMPLETED. EACH STATEMENT
WILL BE FOLLOWED BY THE FOLLOWING FIVE DESCRIPTIONS:

[2] U1
[3] '

DECIDE WHICH OF THE FIVE DESCRIPTIONS BEST DESCRIBES
THE WAY YOU FEEL ABOUT THE STATEMENT. TYPE YOUR ANSWER
(FROM 1 TO 5) BELOW THE SET OF STARS.'

[4] KK←0
[5] T←15p0
[6] AK←0
[7] B4:AK←AK+1
[8] →((AK≤15)^(KK=0)∨(KK=1))/B11
[9] →(2=KK←KK+1)/B3
[10] '

HERE IS A REVIEW OF THE STATEMENTS WITH THE DESCRIPTIONS
YOU HAVE CHOSEN.

[11] →6
[12] B11:''
[13] (0,AK)RESP ST,PE
[14] ''
[15] →((KK=3)∨(KK=1))/B6
[16] (1 5)RESP U1,CR
[17] →(0=T[AK]←INP2 5)/0
[18] →((KK=2),(KK≠2))/B1,B4
[19] B6:(0,T[AK])RESP U1,CR
[20] →((KK=3),(KK≠3))/B2,B4
[21] B3:'

READ THE LIST CAREFULLY (TAKE YOUR TIME). IF YOU THINK
THE LIST IS CORRECT, TYPE Y. IF YOU WOULD LIKE TO CHANGE
SOME OF THE ANSWERS TYPE N.

[22] S←9 CHECK 'Y'
[23] →(S≠1)/B7
[24] '

THANK YOU. THAT IS ALL.

[25] T
 [26] →0
 [27] B7: '

HOW MANY ANSWERS WOULD YOU LIKE CHANGED?

'

[28] AR←CODE
 [29] ('YOU WANT ' ;AR; ' ANSWER' ; (~AR=1) / 'S' ; ' CHANGED? ')
 [30] S←9 CHECK 'Y'
 [31] →(S=0) / B7
 [32] AL←10
 [33] C←10
 [34] RR←0
 [35] '

TYPE THE LETTER FOR: '

[36] B5:RR←RR+1
 [37] B8: ''
 [38] ('CHANGE ' ;RR)
 [39] →(0=A←ALPH RR) / 0
 [40] AL←AL,A
 [41] C1←NUCON AL[RR]
 [42] →((+/(C∈C1),0)=0) / B9
 [43] ''
 [44] ('YOU HAVE ALREADY USED ' ;AL[RR])
 [45] 'TRY AGAIN.'
 [46] AL←AL[1(ρ,AL)-1]
 [47] →B8
 [48] B9:C←C,C1
 [49] →((ρ,C)<AR) / B5
 [50] J←0
 [51] KK←2
 [52] B1:J←J+1
 [53] →(J>AR) / B10
 [54] B12:AK←C[J]
 [55] →B11
 [56] B10: '

HERE IS A LIST OF THE STATEMENTS WITH THE DESCRIPTIONS
 WHICH YOU HAVE CHANGED.

'

[57] J←0
 [58] B2:J←J+1
 [59] →(J>AR) / B3
 [60] KK←3
 [61] →B12


```

      ▽ A←ALPH B
[1]   CO←0
[2]   CO←CO+1
[3]   A1: '*****'
[4]   I←[]
[5]   →((+/(I∈'ABCDEFGHIJKLMNO'),0)=1)/18
[6]   →(CO≠3)/9
[7]   A←0
[8]   →0
[9]   '
      ONLY ALPHABETIC CHARACTERS FROM A TO O ARE TO BE USED.
      TRY AGAIN.
      '
[10]  →((CO=2),(CO=1))/ 16 2
[11]  '
      PLEASE CALL MR. ROMANIUK.
      '
[12]  OH←[]
[13]  →(OH='Y')/A1
[14]  '
      YOU HAVE NOT FOLLOWED DIRECTIONS.
      CALL MR. ROMANIUK.
      '
[15]  →12
[16]  '
      THIS IS YOUR THIRD AND LAST TRY AT TYPING THE LETTER.
      '
[17]  →2
[18]  A←I
      ▽

```

```

      ▽ R←ANS CHEK1 IN
[1]   BJ←ρ,ANS
[2]   I←ρ,IN
[3]   →((I>BJ)∨(I<BJ))/7
[4]   →(ANS≠IN)/7
[5]   R←1
[6]   →0
[7]   →(I≠4)/11
[8]   →(IN≠'STOP')/11
[9]   R←-1
[10]  →0
[11]  R←0
[12]  →0
      ▽

```


▽ S←COUN CHECK ANS

```

[1] CR←0
[2] CR←CR+1.
[3] ''
[4] '****'
[5] IN←[]
[6] R←ANS CHEK1 IN
[7] ''
[8] CN←COUN
[9] U1←(R=1),(R=-1),((CN>2)^(R=0))
[10] →U1/ 23 29 37
[11] →((CR<3),(CR=3))/ 16 19
[12] ('YOU HAVE HAD FOUR TRIES AT TYPING ';ANS;' .CHECK')
[13] 'WITH MR. ROMANIUK TO FIND THE DIFFICULTY.'
[14] S←0
[15] →0
[16] ('YOU HAVE NOT TYPED ';ANS;' . CHECK THE KEYBOARD,')
[17] ('TYPE ';ANS;' AND DO NOT FORGET THE RETURN KEY.')
```

→2

```

[19] ('THAT IS THREE TRIES AT TYPING ';ANS;' . IF YOU DO')
[20] ('NOT TYPE ';ANS;' ON THE NEXT ATTEMPT, THIS INTERVIEW')
[21] 'WILL BE TERMINATED. I WILL WAIT FOR YOUR ANSWER.'
```

→2

```

[23] S←1.
[24] →0
[25] 'IF YOU ARE TAKING PART IN THE COMPUTERIZED INTERVIEW,'
[26] 'YOU CAN DO SO ONLY FROM THE UNIVERSITY OF ALBERTA.'
```

S←4

```

[28] →0
[29] S←-1
[30] →0
[31] 'LETS GO OVER THOSE INSTRUCTIONS AGAIN.'
```

''

```

[33] S←2
[34] →0
[35] S←3
[36] →0
[37] R←'N' CHEK1 IN
[38] →(R=0)/42
[39] →(CN=2+16)/ 25 31 35 0 14 40
[40] S←0
[41] →0
[42] ''
[43] →((CR=2),(CR=3))/ 47 49
[44] ('TYPE Y OR N , YOU HAVE TYPED ';IN;' .')
```

ANS←'Y'

```

[46] →2
[47] 'THIS IS YOUR LAST TRY AT TYPING Y OR N.'
```

→45

```

[49] S←-1
[50] →0
```

▽


```

      ▽ C←CODE
[1]  NB←0
[2]  ''
[3]  NB←NB+1
[4]  →((NB=3),(NB=5))/ 32 35
[5]  '****'
[6]  N←□
[7]  ''
[8]  →(((ρ,N)>2)∨(ρ,N)=0)/28
[9]  →(0=(+/( ' '=N),0))/15
[10] 'THERE ARE SPACES IN YOUR ANSWER. I WILL'
[11] 'REMOVE THEM AND CHECK FURTHER.'
[12] ''
[13] N1←( ' '≠N)/N
[14] →16
[15] N1←N
[16] →(1=(×/(N1∈'0123456789'),1))/21
[17] 'THERE ARE ALPHABETIC OR NONNUMERIC CHARACTERS'
[18] 'IN YOUR ANSWER . PLEASE CORRECT.'
[19] ''
[20] →2
[21] N2←('123456789')∖N1
[22] →(((×/(N2=10),1)=1),(×/(N2= 1 10),1)=1)/ 30 37
[23] →(((ρ,N2)=1),(ρ,N2)>2)/ 25 28
[24] N2←N2[2]+10×N2[1]
[25] →(N2>15)/2 8
[26] C←N2
[27] →0
[28] →(NB=4)/35
[29] 'YOUR ANSWER MUST BE LESS THAN OR EQUAL TO FIFTEEN.'
[30] 'TRY AGAIN.'
[31] →2
[32] 'THIS IS YOUR THIRD AND LAST TRY AT TYPING YOUR'
[33] 'CODE NUMBER.'
[34] →2
[35] C←-1
[36] →0
[37] N2← 1 0
[38] →2 4

```

▽


```

      ▽ T←INP2 NO
[1]   CO←0
[2]   CO←CO+1
[3]   '****'
[4]   IN←□
[5]   →(((ρ,IN)>1)∨(0=x/(IN∈'123456789'),1)) / 9 9
[6]   →(NO<INN←('123456789')\IN)/9
[7]   T←INN
[8]   →0
[9]   →((CO=2),(CO>2)) / 12 14
[10]  '
      TRY AGAIN.'
[11]  →2
[12]  '
      THIS IS YOUR LAST TRY.'
[13]  →2
[14]  '
      PLEASE CALL MR. ROMANIUK .'
[15]  T←0
      ▽

```

```

      ▽ C1←NUCON AA
[1]   STRING←'ABCDEFGHIJKLMNOPQRSTUVWXYZ'
[2]   ZZ←0
[3]   ZZ←ZZ+1
[4]   →(AA≠STRING[ZZ])/3
[5]   C1←ZZ
      ▽

```



```

      ▽ H←E RESP L
[1]   →(E[1]=0)/4
[2]   H←L[1((ρL)-1)]
[3]   →0
[4]   VU←0,U←((LL←L[1(ρL)-1])←LM←L[ρL])/1(ρL)-1
[5]   H←LL[DE+1VU[E[2]+1]-DE←VU[E[2]]]
      ▽

```

ST

- A) I RECEIVED ENOUGH INFORMATION DURING THE INTERVIEW TO HELP ME PLAN MY HIGH SCHOOL PROGRAM.
- B) THE INTERVIEW WAS BORING.
- C) THERE WERE TIMES I DISAGREED WITH SOME OF THE COURSES SELECTED FOR MY PROGRAM.
- D) I WOULD HAVE LIKED THE COMPUTER TO TELL ME THAT THE CHOICES I MADE WERE THE CORRECT ONES.
- E) SOME OF THE TOPICS DISCUSSED IN THE INTERVIEW WERE CONFIDENTIAL.
- F) I COULD HAVE MADE THE SAME PROGRAM WITHOUT THE HELP OF THE COMPUTER.
- G) IT FELT LIKE THE INTERVIEW WOULD NEVER END.
- H) I AM HAPPY WITH MY PROGRAM.
- I) I HAD A LOT OF SAY IN THE COURSES SELECTED FOR MY PROGRAM.
- J) I THINK MY PROGRAM WILL HAVE TO BE CHANGED.
- K) THE INSTRUCTIONS GIVEN BY THE COMPUTER WERE EASY TO FOLLOW.
- L) THERE WERE TIMES I FELT LIKE STOPPING THE INTERVIEW.
- M) IT WAS EASY TO TALK TO THE COMPUTER.
- N) IT FELT LIKE THE COMPUTER WAS RUSHING ME THROUGH THE INTERVIEW.
- O) I WOULD RATHER BE INTERVIEWED BY A HUMAN COUNSELOR.

U1

- 1. STRONGLY DISAGREE
- 2. DISAGREE
- 3. UNDECIDED
- 4. AGREE
- 5. STRONGLY AGREE

PE

B29898